

DE-1000 离心机
齿轮箱驱动

发布日期：**2009** 年 **5** 月 **4** 日
修改日期：**2010** 年 **3** 月 **31** 日

维护和操作手册

油和气应用部
Derrick 设备公司
德克萨斯州休斯敦市，77032
Export Plaza Drive15630 号
电话: 281.590.3003
免费电话: 1.866.DERRICK
传真: 281.442.6948
www.derrickequipment.com



装置编号对于提供DERRICK专业服务十分关键

对 Derrick 所有产品的询问均需提供设备编号。安装在每台 Derrick 设备上的不锈钢编号牌是确保得到有效服务和支持的关键。



典型的 Derrick 装置编号

独一无二的装置编号可以向服务人员提供重要信息，帮助在填写订单时识别正确的部件、对售后服务的问题提供精准的回复、追查资料、追查设备历史记录或配置等。简单地讲，**装置编号提供能够确保 Derrick 用户得到最佳服务所需的关键信息。**

装置编号包括一个用来表示设备类型的双字符字母前缀和一个表示设备制造顺序的序列号。例如：装置编号为 MA000001 表示第一台 Derrick 制造的筛分机。目前仍在使用的字母前缀如下：

- MA – 筛分机
- DG – 除气装置
- CF – 离心机
- AD – 集尘器与分砂器
- AG – 泥浆搅拌机
- SF – 筛分系统

为确保经过多年在严酷环境下使用后装置编号牌仍能保持完整无损，要用铆钉将重型荷载工况下的设备编号牌铆固到包括振打装置支撑结构等的结构件上。不要与设备上包括振动电机序列号等在内的任何其它标识符混淆。

为便于了解，随设备一道提供的操作维护手册中也记录有装置编号。与 Derrick 公司就任何设备问题或有任何需要进行联系时，请将装置编号准备好。这是从我方专业服务和设计人员得到最有效服务的最佳办法。



关于本手册

本手册有印刷板和电子版。在电子版手册中，目录所列所有章节和段落均对应于相应的文本。

按以下方式浏览电子手册：

1. 查阅所需信息时，请点阅 **CONTENT**（目录）页，并将光标移动到所需段落或章节的标题上。
2. 如果要显示所需的信息，可在文本上出现小指头书签时点击清单。
3. 文本查阅完毕后，按 **Alt +** 左箭头键返回目录页。
4. 如果要返回前个信息，请按下 **Alt +** 右箭头。查找其它内容时，请重复第 **1** 步和第 **2** 步。

本资料的内容可能随时发生变动。本手册所包含信息既不包括 Derrick 设备的全部细节或可能发生的全部修改，也不包括与设备安装、操作、维护或故障处理有关的所有偶然事件。如需更多资料，或者出现本手册未包括的其它情况，请将问题交由 Derrick 公司当地的代表处或 Derrick 公司位于纽约州布法罗市的售后服务部处理。



目　录

章节　　页码



第 1 章：前言

概况

本手册提供 DE-1000 齿轮箱驱动（GBD）离心机（见图 1-1）的安装、操作和维护指导。为方便用户使用，手册分为许多章节。负责设备运输、安装、操作或维护工作的人员必须阅读并领会手册内容和指导。应准备一套手册放在设备就近处，并且易于取到。

为使设备达到最大安全性和最佳性能，未经 Derrick 公司明确书面许可，不得对设备做任何补充和/或修改。维修工作要求使用 Derrick 专用修理/更换部件。



图 1-1：DE-1000 齿轮箱驱动 (GBD) 离心机

安全

本手册第 2 章包含与本设备操作维护有关的安全信息。所有人员必须阅读并领会这些信息。

如果查明设备的任何机械或电气元件出现缺陷或者故障，不得对设备进行操作。

设备使用

DE-1000 GBD 离心机专为从泥浆中将低比重固体料分离出来而设计。要么是将固体分离出来并将液体返回流程循环。要么就是将固体返回工作系统而将液体废弃。

Derrick 公司未授权对本设备做其它使用。设备的设计用途包括要满足本手册所述操作、维护和安全规程。

描述

离心机主要构件（见图 1-2）包括旋转装置总成、齿轮箱驱动装置总成、液力偶合器、电气控制箱、驱动电机、振动开关、壳体、底座总成和滑架。以下段落将分别对这些构件进行了描述。

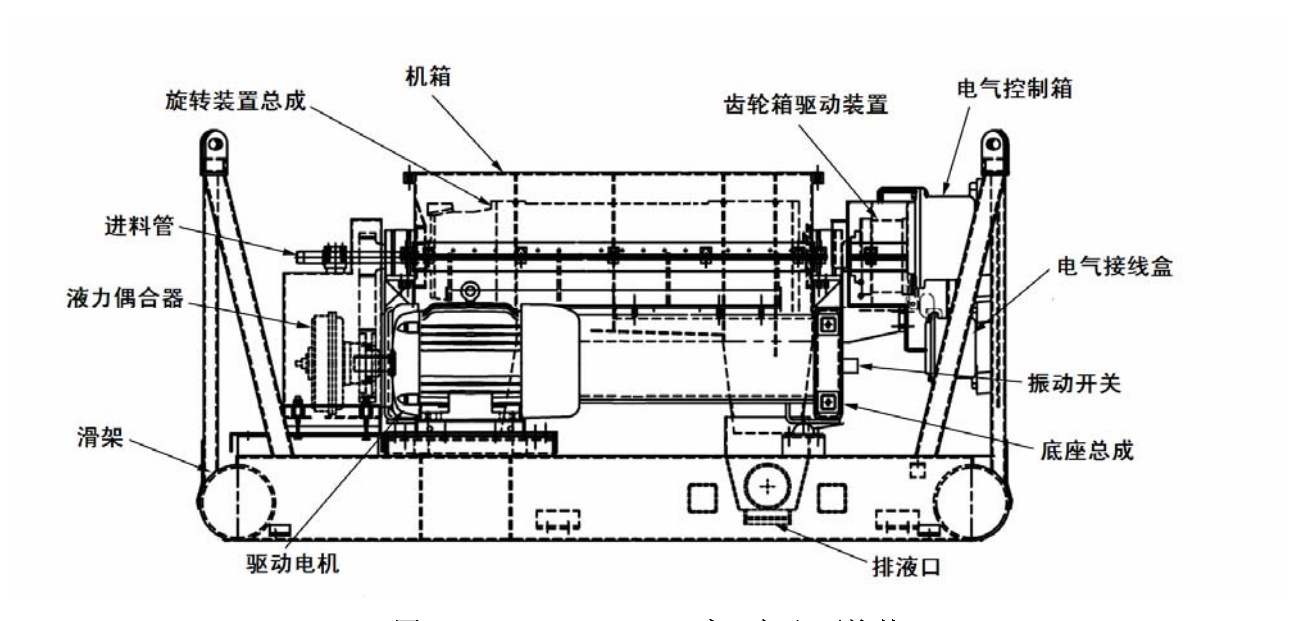


图 1-2：DE-1000 GBD 离心机主要构件

旋转总成

旋转总成包括圆柱形不锈钢转鼓、传输装置总成和相关构件。转鼓两端都有开口：固体排料端是一个锥形头，对面是平面的液体转鼓头。转鼓两端采用油润的滚珠轴承支撑。

转鼓总成

转鼓总成的圆柱形转鼓一端连接液体转鼓头，另一端连接固体转鼓头。液体转鼓头上的可调式溢流堰便于人工调节液池的深度。溢流堰上的示量标记便于精确进行设定。液池深度和其它因素有助于确定所排固体中的含液量。固体端锥形转鼓延伸部分形成向上斜坡，固体集中于此并通过固体排料口连续排出。固体转鼓头有四个固料排出口。固体转鼓头上的可更换式耐磨插件可以保护开口不受磨损。

传输装置

传输装置总成是一个中空的圆柱形螺旋输送机，可以将料浆进料送入其内部，然后通过喷嘴再分配到转鼓总成，并且将固料输送到固料排出口。传输装置采用差动齿轮箱驱动，旋转方向与转鼓一致，但速度缓于后者。延伸转鼓头的驱动轴将齿轮箱的动作传递到传输装置。插入传输装置固料端的进料管使料浆进料对准进料加速器，使物料能够迅速通过进料喷嘴分配到传输装置里。进料喷嘴中的碳化物插件和传输装置刮板边缘的碳化板具有很强的耐磨性。传输装置两端采用轴台安装的油润滚珠轴承支撑。

驱动箱驱动装置

齿轮箱驱动装置是一种差动减速齿轮箱，它驱动传输装置以比转鼓总成转速呈比例减缓的速度进行旋转，有效的传动比为 52:1 和 125:1。齿轮箱安装在传输装置的液体端，用液体端的传输装置轴承支撑。

一个两级行星齿轮系统驱动从一个环形齿轮向一个二级小齿轮传输。该二级小齿轮的用途是驱动传输装置的轴。传输装置旋转速度的变化直接受转鼓速度的影响，二者之间保持恒定的差动关系以便进行固体的传输。如果固体量过大阻碍到传输装置的转动，环形齿轮转动速度开始减慢，造成一级中心齿轮旋转。到达传输装置的扭矩极限时，中心齿轮旋转充分，使过载安全总成脱扣并自动停下离心机。

过载安全离合器

当传输装置旋转所要求的扭矩过大（335 英寸 • 磅 - 52:1 齿轮箱；200 英寸 • 磅 - 125:1 齿轮箱）时，旋转过载安全离合器 (图 1-3) 会断开驱动电机和进料泵的电源从而对离心机实现保护。两个止动块之间悬挂着的扭矩臂与离合器相连，防止离合器随齿轮箱环形齿轮一道旋转。离心扭矩凸轮与齿轮箱一级中心齿轮啮合。如果传输装置扭矩异常升高，一级中心齿轮会随传输装置一道旋转，造成扭矩凸轮旋转。当扭矩凸轮旋转充分并偏离辊臂时，常闭过扭矩限制开关将打开，断开驱动电机和进料泵电机的电源并使离心机停车。过载释放之后，离心机返回运行之前必须先手动复位离合器（参见第 5 章的内容）。

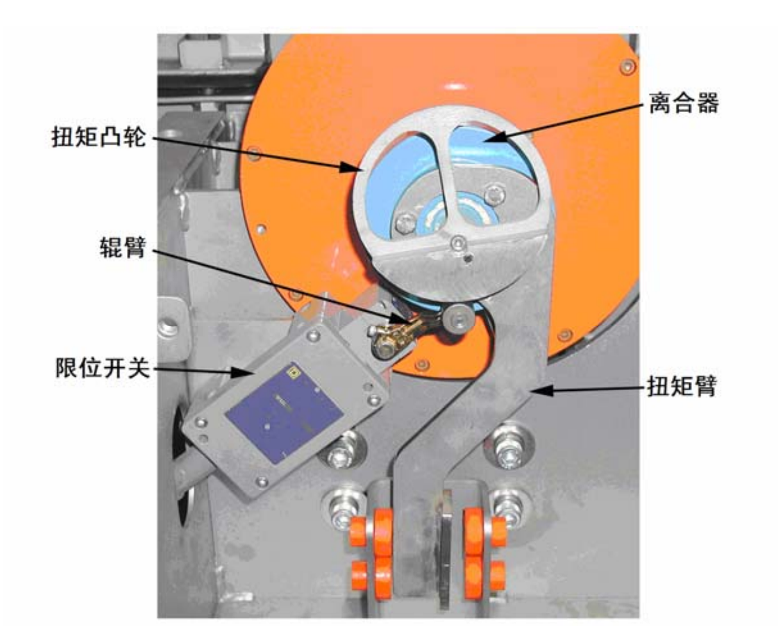


图 **1-3**：过载安全离合器

液力偶合器

安装在电机轴上的液力偶合器可缓冲驱动电机的起动扭矩。当偶合器的外毂与皮带轮连接时，电机轴的旋转动作会传输到液力偶合器的内毂上。偶合器液压带动皮带轮旋转，缓慢克服旋转总成的惯性并逐渐平稳地加速。

电气控制箱

离心机的操作由电气控制箱（见图 1-4）控制。电气控制箱包括对驱动电机和料浆进料泵进行操控的部件。CENTRIFUGE ON/OFF（离心机开/停）开关、PUMP ON/OFF（泵开/停）开关以及工作时间指示器均安装在面板上。每个开/停开关均垂直对分，ON（开）在左侧，OFF（停）在右侧。配备的复位按钮便于在跳闸后对离心机和泵的运行继电器进行手动复位。继电器内装热过载保护，当出现实际过电流时可使离心机或进料泵停车。机械按压复位开关可对其相应的继电器发生作用。当传输装置的压力要求达到 1500PSI 时，压力开关使进料泵停车；当压力降到 700PSI 时重新起动进料泵。

电气控制箱（续）

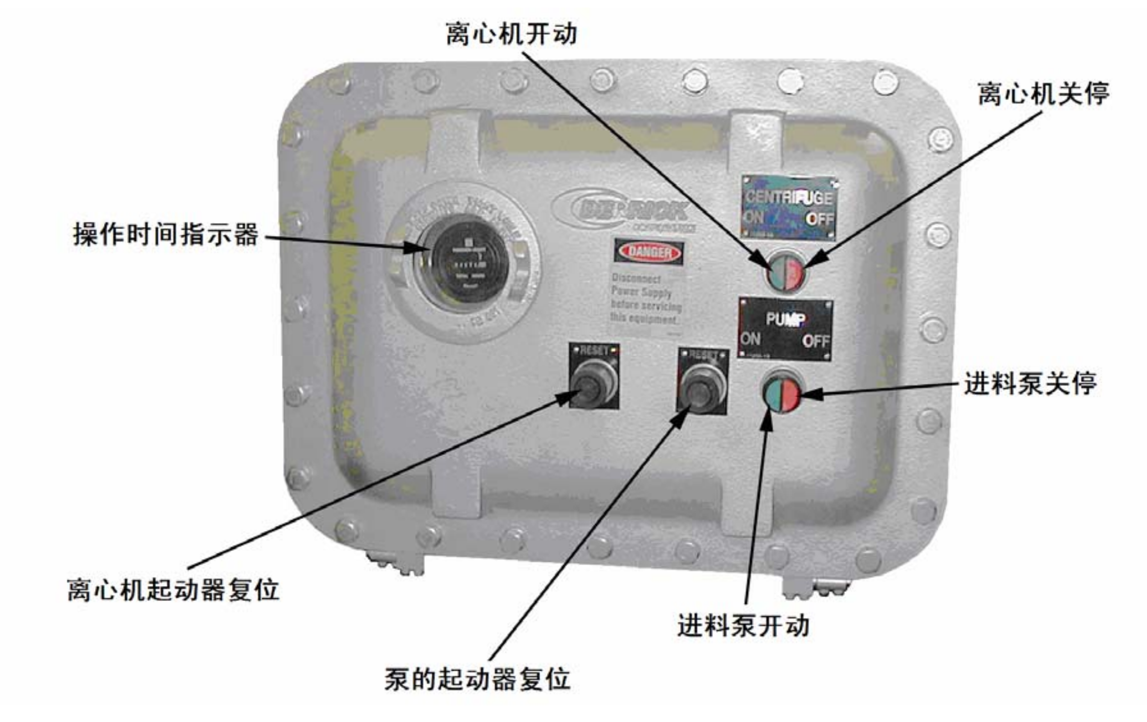


图 **1-4**：电气控制箱

驱动电机

50HP, 460Vac / 60Hz 或 380Vac / 50Hz、三相、防爆电动机通过皮带轮和传动皮带与液体转鼓总成连接。动作通过液力偶合器传输给皮带轮，该偶合器直接与电机轴连接。为保护人身安装，皮带轮和传动皮带上盖有防护罩。

60Hz 电动机工作转速为 1760RPM，50Hz 电动机工作转速则为 1475RPM。电动机定子绕组中的温度感应元件能够使电动机在达到异常高温时停车。

振动开关

振动开关（见图 1-5）是一种安全装置，专为出现过度振动时为保护人员和设备而停止离心机运行而设计。正常情况下，开关触点通过一个机械式压紧闩的作用保持闭合。但是，当出现达到 2G 的强烈振动或冲击时，磁性压紧闩将会脱开，使开关磁舌脱离常闭位置，从而断开到离心机运行继电器在 CR1 的电源。必须手动按下开关侧面的复位开关，使触点闭合并重新接合磁性压紧闩。振动脱扣级别可以通过设定值调节开关进行调节，该调节开关可以调节磁部件与闩臂片之间的间隙。逆时针方向旋转可以降低磁舌脱扣所需的以“G”力表示的振动设定值。将调节开关按顺时针方向完全拧到头时，开关将在达到额定的最大振动级别时脱扣。

振动开关安装在离心机框架上最易受到转鼓总成不平衡振动力影响的方位。传输装置堵塞或轴承磨损时都会产生足以使该开关脱扣的振动。



图 **1-5**：振动开关

壳体、底座和滑架

不锈钢上下两个部分的壳体构成将转鼓总成完全包围的密封保护外壳。液体排放管和固料排放斜槽安装在下半部分壳体的底部。上下两半壳体内部安装的配套隔板将固体和液体分开。螺栓有效地将上下两半壳体连接起来，上壳体中的橡胶垫圈有效密封上下两半壳体。转鼓总成液体端的齿轮箱配备有单独的两片式保护外壳。

壳体与焊接的钢制底座总成栓接，该底座有轴承轴台和进料管支架的安装预留口。底座总成与焊接的钢制滑架栓接。

机械操作

离心机在设备皮带轮端部（固体排料端）进料。为达到最佳性能，料浆进入离心机之前应当用振动筛分机过滤到 74 微米。

料浆通过进料管流入旋转的转鼓中，转鼓中的离心力将液体与固体分离开。液体从离心机齿轮箱一端的液体排放口流出，固体则输送到固体排料端并排入设备底部的溜槽。

离心机的工厂设置为采用规定的 AC 电压等级、三相、50Hz 或 60Hz 电源。电气控制元件安装在位于设备液体排放端一侧的电气控制箱内。出现传输装置压力过大、电机温度过高、振动过度或其它误动作时，离心机内置的安全保护装置通过停止驱动电机工作有效地保护人员和设备的安全。

转筒高速旋转所产生的 G 力将固体从进料泥浆中分离出来。离心机的性能取决于以下三个变量:

- 作用到液体上的力 G—重力将液体从离心机外壁抽走。
- 离心机里的停留时间—泥浆在离心机里停留时间越长，能够分离的固体颗粒越小。
- 传输机的差动速度—传输机旋转速度越快，固料含湿量越高，排出的固体量越多。

可以通过对上述三个因素进行控制来达到修改液体和固体排料情况的目的。修改电机皮带轮的直径可以改变转鼓的转速。调整液体转鼓头上的液体排放口可以控制料浆停留时间，从而改变液池深度（即液位高度）。改变齿轮传动比可以改变传输装置的差动速度。传输装置运行的速度低于转鼓的运行速度；其速度从齿轮传动比推导而来。转鼓和传输装置的传输速度不同。

任何参数进行调节时都要求设备停车，包括液池深度、转鼓速度、传输装置的差动速度等调节。改变排料结果的另外一种方法是改变进料速率。

离心机工作时，料浆通过进料管泵送到旋转的传输装置的中心（见图 1-6），并在此迎着进料加速器飞溅转动。接着，高速料浆通过安装在传输装置缸体周围的四个进料喷嘴流出。由于转鼓转速高于传输装置的转速，因而会额外产生一种剪力效应，从而进一步增加料浆的加速度。

当料浆流入传输机刮板之间的通道时，较重的固体颗粒由于转鼓所产生的力 G 而加速沉积。砂状颗粒几乎瞬间就沉淀下来；然后沉淀的是较轻较细的颗粒。在目前设定的离心力条件下不能沉降的颗粒将随着液体通过液体转鼓头上的可调式溢流堰排出。流出液体转鼓头的液体经过液体排料口。

沉积下来的固体在转鼓内部形成一层饼状物，并通过传输装置送到转鼓的狭长端，或曰砂滩端。由于固体输送时要经过砂滩，它们的自由液膜会由于离心式挤水和脱水作用而脱除。当固料通过转鼓的固体排料口高速排出时就只剩下吸附水份。

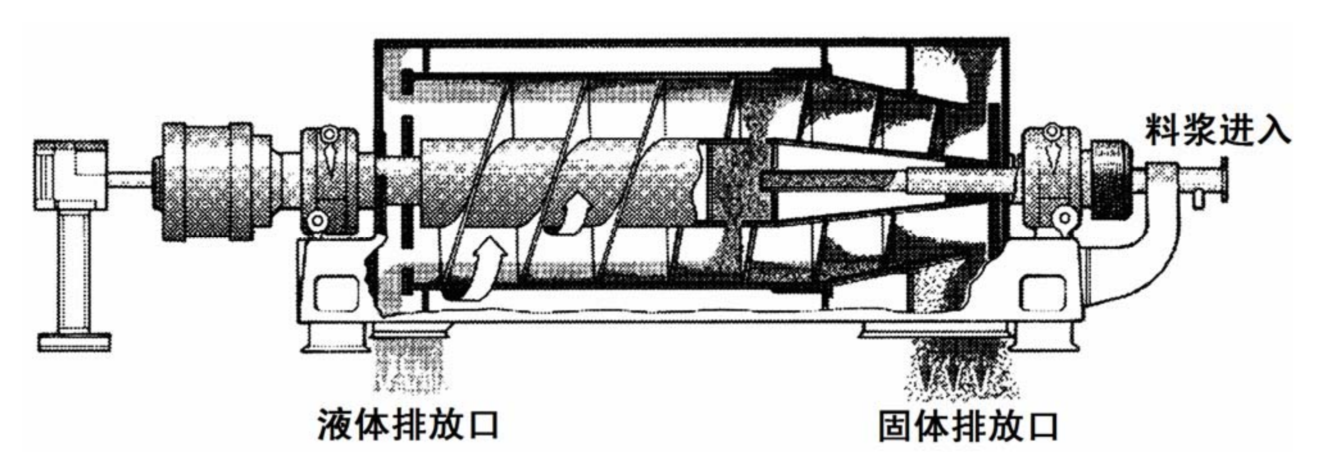


图 1-6：离心机的操作

电气控制系统的操作

以下部分对电气控制系统进行了描述。这些信息有助于理解离心机的工作情况，便于进行故障处理。以下部分描述了驱动电机和进料泵控制回路的操作情况。

驱动电机

按下 CENTRIFUGE ON（离心机开动）按钮让离心机电源电流通过开关的常开（N/O）接点、常闭（N/C）热过载接点、常闭（N/C）过扭矩开关的接点、常闭（N/C）振动开关的接点和常闭（N/C）电机的过热接点，接通离心机运行继电器 CR1。运行继电器 CR1 通电后，电流作用于 50 HP 电机。另外，进料泵回路通电，允许起动料浆进料泵，并且经时计通电。

进料泵

按下 PUMP ON（泵开动）按钮可以使电流通过开关的常开（N/O）接点和常闭（N/C）热过载保护接点，使泵的起动继电器 CR2 通电。松开按钮后，通过按钮 NC（常闭）接点和 CR1、CR2 继电器接点形成的并联回路的电流能够得以保持。按下 PUMP OFF（泵停止）按钮使 CR2 继电器断电，停下进料泵电机和离心机驱动电机。

安全

出现以下情况时，离心机控制系统可以保护离心机：

- 驱动电机电流要求过高
- 传输装置扭矩过高
- 振动过度
- 驱动电机过热

以上任何情况都会使 CR1 继电器断电。继电器的 N/O（常开）接点打开会使离心机运行继电器 CR1 断电并停下驱动装置的电机和进料泵的电机。离心机一旦由于以上任何原因停车，应当在消除停车原因后按下 CENTRIFUGE ON（离心机开动）按钮重新起动。

热过载

如果驱动电机或进料泵电机的牵引电流过大，电气控制盘中相应的热过载保护开关将会脱扣。只有消除过载原因后，才能按下离心机和泵的起动 RESET（复位）按钮重新起动离心机。

振动

振动保护开关可以在出现振动过度时断开到离心机运行继电器 CR1 的电源。消除异常振动的原因之后，按下振动开关外壳上的按钮来磁锁开关接点使电源恢复。然后按下 CENTRIFUGE ON（离心机开动）按钮重新起动离心机。

电机过热

电机过热保护开关可以在驱动电机过热时断开到运行继电器 CR1 的电源。电机经过冷却并且消除过热原因之后，按下 CENTRIFUGE ON（离心机开动）按钮重新起动离心机。

联系信息

联系信息			
地点	电话	传真	电子邮件 / 网址
美国纽约州布法罗市 Duck 路 590 号，14225 **Derrick 公司**	716.683.9010	716.683.4991	服务部总经理 *toconnor@derrickcorp.com*
美国德克萨斯州休斯敦市 Export Plaza Drive15630 号，77032 Derrick 设备公司	281.590.3003	281.442.6948	总经理 *rerice@derrickequipment.com*
GERMANY 德国法灵博斯特尔 Bockhorner Weg 6 29683 Derrick 公司	+49 5162 98580	+49 5162 985821	Info@derrickinternational.com www.derrickinternational.com

产品支持

Derrick 公司提供每天 24 小时，每周 7 天的产品支持。产品支持范畴包括滤网更换/订购信息和整个生产线的修理/更换部件和服务。参见下表查找距离你方最近的部件/服务中心。

部件销售与服务地点
科罗拉多- 970.241.2417
路易斯安那
布鲁萨尔德- 877.635.3354
密西西比
劳里- 877.635.3354
纽约 – 公司总部
布法罗- 716.683.9010
俄克拉何马
奥克拉荷马市- 405.208.4070
德克萨斯
休斯敦 (Oilfield Headquarters) - 866.DERRICK (337.7425)
布里奇波特- 940.210.9975
库普斯・库瑞斯蒂- 361.664.2410
朗维龙- 337.298.9411
米德兰- 432.230.3720
怀俄明- 307.265.0445
德国- 011.49.5162.98580



第 2 章：安全

概述

本章概述了手册中所使用的所有警示牌以及设备适用的材料安全数据表（MSDS）。离心机设计为要能够安全实现所述的各项功能。.

警示

负责对本设备进行操作和维护的人员在操作和/或维护之前，都必须阅读并领会本手册中的所有安全信息。以下所列安全警示牌包含在手册适用的章节中。

声音

	**警示!** 为避免丧失听力，在 **Derrick** 设备上或附近工作的任何时候都应当佩戴好保护耳罩。

电气危险

	**警示!** 为避免人员受重伤，设备维护和/或调整之前必须将设备切断、挂牌上锁、断开电源，并且停止转动。
	**警示!** 驱动电机必须在指定的电压等级条件下工作。
	**警示!** 可能有高压。确保设备的熔断电源是断开的。进行设备维护和/或调整时，一定要切断电源并挂牌上锁，以防意外送电。
	**警示!** 电气连接必须符合国家电气法规（**NEC**）和所有适用的地方性法规。违反这些法规规定会造成可能导致人员受伤和设备损坏的不安全条件。要确保所有电气和导线管连接均牢固可靠。

设备搬运

	**警示!** 设备提升时要使用舒展杆，以防设备提升时受损。
	**警示!** 提升时要确保设备正确地平衡和定位，以防损坏设备部件。只能在指定的起吊点固定吊绳。起吊时不能将吊绳固定在电机或其它任何位置。
	**警示!** 确保起吊装置的起吊能力足以安全处理待吊设备的重量。
	**警示!** 设备定位到最终安装现场之前不得拆除运输托架。

操作

	**警示!** 对设备进行操作和维护之前，所有相关人员必须先阅读并领会手册中的所有安全信息。
	**警示!** 设备起动之前，首先要确保所有防护装置均已安装到位且牢固可靠，并且所有人员均已远离设备。
	**警示!** 离心机起动之前，首先要确保所有运输托架均已拆除，所有轴承轴台均已正确紧固。
	**警示!** 打开顶盖或拆除防护板之前，必须让机器惯性滑行直至完全停止转动。
	**警示!** 如果出现异常噪音或振动时，不得对离心机进行操作。必须随时确认振动开关和其它安全装置工作正常。

维护

	**警示!** 可能有高压。必须断开设备的熔断电源。进行任何设备维护和/或调整之前必须切断电源并挂牌上锁。

储存



警示! 在湿度高的环境里（相对湿度大于 **50%**）存放离心机会使其损坏。设备必须存放在湿度低的环境中。

材料安全数据表 (MDDS)

外表打磨抛光产品的材料安全数据表 (MSDS)罗列在以下部分，目的是告知相关人员这些材料的特性和可能存在的危害。这些资料由产品制造商制备并对资料的精准度负完全责任。

所含材料安全数据表是手册发布之日现行有效的，仅做参考之用。最新资料应由用户负责与产品制造商联系索取。

除最终产品的资料外，设备所用的其它产品也列有材料安全数据表。为确保获取目前的资料，产品采购时可以得到每种产品的材料安全数据表。请注意：与所列材料同等的产品经由 Derrick 公司批准，可以用于相应的领域。

应用 – 描述	材料安全数据表编号 / 日期
涂料	
迪威耳高光油霸面漆 359 – 面漆	359 / 05-06-08
迪威耳环氧树脂底漆 – 底漆	313K / 08-02-04
润滑剂	
北极环境	
所有轴承 – 壳牌 Aeroshell GR-14	*56200E-9* / 10-23-03*
齿轮箱 – 美孚 SH 220	联系制造商*
液力偶合器 – 美孚 SCH 626	联系制造商*
过载安全离合器 – 壳牌 Aeroshell GR 14	*56200E-9* / 10-23-03*
标准环境	
所有轴承 – 雪佛龙 SRI NLGI 2	*6979* / 08-03-04*
齿轮箱 – 壳牌 Omala 320	*
液力偶合器 – 雪佛龙 GST ISO-32	*
过载安全离合器 – 壳牌 Aeroshell GR 14	*56200E-9* / 10-23-03*
食品等级	
仅主轴承 – 雪佛龙 SRI NLG1 2	*6979* / 08-03-04*
仅传输装置轴承 – 美孚 FM 102	*642363-00* / 01-17-02*
密封剂	
乐泰防粘着润滑剂 – 紧固剂	*76764* / 09-27-04*

*没有材料安全数据表的：可与制造商联系索要最新修订版。



MATERIAL SAFETY DATA SHEET

prepared 05/06/08

ICI Paints North America 15885 Sprague Road Strongsville, Ohio 44136 EMERGENCY TELEPHONE NO. (800) 545-2643

HAZARDS IDENTIFICATION (ANSI Section 3)

Primary route(s) of exposure : Inhalation, skin contact, eye contact, ingestion.

Effects of overexposure :

Inhalation : Irritation of respiratory tract. Prolonged inhalation may lead to. Inhalation of spray mist may cause irritation of respiratory tract. Mucous membrane irritation, fatigue, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, abdominal pain, chest pain, coughing, apathy, central nervous system depression, intoxication, anesthetic effect or narcosis, difficulty of breathing, allergic response, tremors, severe lung irritation or damage, pulmonary edema, pneumoconiosis, loss of consciousness, respiratory failure, death. Possible sensitization to respiratory tract.

Skin contact : Irritation of skin. Prolonged or repeated contact can cause dermatitis, defatting, severe skin irritation. Possible sensitization to skin.

Eye contact : Irritation of eyes. Prolonged or repeated contact can cause conjunctivitis, blurred vision, tearing of eyes, redness of eyes, severe eye irritation, corneal injury.

Ingestion : Ingestion may cause lung inflammation and damage due to aspiration of material into lungs, mouth and throat irritation, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, diarrhea, gastro-intestinal disturbances, abdominal pain, visual disturbances, apathy, central nervous system depression, intoxication, anesthetic effect or narcosis, burns of the mouth, throat, stomach, pulmonary edema, loss of consciousness, respiratory failure, death.

Medical conditions aggravated by exposure : Eye, skin, respiratory disorders, kidney disorders, liver disorders, nervous system disorders, respiratory disorders.

FIRST-AID MEASURES (ANSI Section 4)

Inhalation : Remove to fresh air. Restore and support continued breathing. Get emergency medical attention. Have trained person give oxygen if necessary. Get medical help for any breathing difficulty. Remove to fresh air if inhalation causes eye watering, headaches, dizziness, or other discomfort.

Skin contact : Wash thoroughly with soap and water. If any product remains, gently rub petroleum jelly, vegetable or mineral/baby oil onto skin. Repeated applications may be needed. Remove contaminated clothing. Wash contaminated clothing before re-use. Dispose of contaminated leather items, such as shoes and belts. If irritation occurs, consult a physician.

Eye contact : Flush immediately with large amounts of water, especially under lids for at least 15 minutes. If irritation or other effects persist, obtain medical treatment.

Ingestion : If swallowed, obtain medical treatment immediately.

FIRE-FIGHTING MEASURES (ANSI Section 5)

Fire extinguishing media : Dry chemical or foam water fog. Carbon dioxide. Closed containers may explode when exposed to extreme heat or fire. Vapors may ignite explosively at ambient temperatures. Vapors are heavier than air and may travel long distances to a source of ignition and flash back. Vapors can form explosive mixtures in air at elevated temperatures. Closed containers may burst if exposed to extreme heat or fire. Dust explosion hazard. May decompose under fire conditions emitting irritant and/or toxic gases.

Fire fighting procedures : Water may be used to cool and protect exposed containers. Firefighters should use full protective clothing, eye protection, and self-contained breathing apparatus. Self-contained breathing apparatus recommended.

Hazardous decomposition or combustion products : Carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, ammonia, hydrogen chloride, toxic gases, barium compounds. Cyanides.

ACCIDENTAL RELEASE MEASURES (ANSI Section 6)

Steps to be taken in case material is released or spilled : Comply with all applicable health and environmental regulations. Eliminate all sources of ignition. Ventilate area. Ventilate area with explosion-proof equipment. Spills may be collected with absorbent materials. Use non-sparking tools. Evacuate all unnecessary personnel. Place collected material in proper container. Complete personal protective equipment must be used during cleanup. Large spills - shut off leak if safe to do so. Dike and contain spill. Pump to storage or salvage vessels. Use absorbent to pick up excess residue. Keep salvageable material and rinse water out of sewers and water courses. Small spills - use absorbent to pick up residue and dispose of properly.

HANDLING AND STORAGE (ANSI Section 7)

Handling and storage : Store below 80f. Store below 100f (38c). Keep away from heat, sparks and open flame. Store in original container. Keep away from direct sunlight, heat and all sources of ignition. Keep container tightly closed in a well-ventilated area.

Other precautions : Use only with adequate ventilation. Do not take internally. Keep out of reach of children. Avoid contact with skin and eyes, and breathing of vapors. Wash hands thoroughly after handling, especially before eating or smoking. Keep containers tightly closed and upright when not in use. Empty containers may contain hazardous residues. Ground equipment when transferring to prevent accumulation of static charge.

EXPOSURE CONTROLS/PERSONAL PROTECTION (ANSI Section 8)

Respiratory protection : Respiratory protection is required for use in isocyanate containing environments. Consider type of application and environmental concentrations when selecting respiratory protection. Observe governmental regulations for respirator use. (29 CFR 1910.134(OSHA))(Canadian z94.4) The use of positive pressure supplied air respirator is mandatory when the airborne isocyanate concentrations are not known. Note: isocyanate based materials have been determined to cause allergic sensitization in humans. Avoid inhalation and dermal (skin) contact with the uncured material.

Ventilation : Provide dilution ventilation or local exhaust to prevent build-up of vapors. Use explosion-proof equipment. Use non-sparking equipment.

Personal protective equipment : Eye wash, safety shower, safety glasses or goggles. Impervious gloves, impervious clothing, face shield, apron, boots.

STABILITY AND REACTIVITY (ANSI Section 10)

Under normal conditions : Stable see section 5 fire fighting measures

Materials to avoid : Oxidizers, acids, reducing agents, bases, aldehydes, halogens, amines, alkalis, water, peroxides, nitric acid, alcohols, combustible materials, caustics, mineral acids. Nitrates.

Conditions to avoid : Sunlight, elevated temperatures, moisture, contact with oxidizing agent, storage near acids, sparks, open flame, ignition sources.

Hazardous polymerization : Will not occur

TOXICOLOGICAL INFORMATION (ANSI Section 11)

Supplemental health information : Contains a chemical that is moderately toxic by ingestion. Contains a chemical that is toxic by inhalation. Contains a chemical that may be absorbed through skin. Free diisocyanate may cause allergic reaction in susceptible persons. Notice - reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Contains iron oxide, repeated or prolonged exposure to iron oxide dust may cause siderosis, a benign pneumoconiosis. Other effects of overexposure may include toxicity to liver, kidney, central nervous system, blood.

Carcinogenicity : Contains formaldehyde, a potential cancer hazard. Rats exposed to formaldehyde via inhalation developed cancer of the nasal cavity. Evidence in humans is limited (nasal and nasopharyngeal cancer). Formaldehyde is listed as a carcinogen by OSHA, probable human carcinogen (group 2a) by IARC, and anticipated human carcinogen by NTP. Overexposure can cause eye, skin, and respiratory tract irritation, and skin and respiratory sensitization. In a lifetime inhalation study, exposure to 250 mg/m3 titanium dioxide resulted in the development of lung tumors in rats. These tumors occurred only at dust levels that overwhelmed the animals' lung clearance mechanisms and were different from common human lung tumors in both type and location. The relevance of these findings to humans is unknown but questionable. The international agency for research on cancer (IARC) has classified titanium dioxide as possibly carcinogenic to humans (group 2b) based on inadequate evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.

Reproductive effects : High exposures to xylene in some animal studies, often at maternally toxic levels, have affected embryo/fetal development. The significance of this finding to humans is not known.

Mutagenicity : No mutagenic effects are anticipated

Teratogenicity : No teratogenic effects are anticipated

ECOLOGICAL INFORMATION (ANSI Section 12)

No ecological testing has been done by ICI paints on this product as a whole.

DISPOSAL CONSIDERATIONS (ANSI Section 13)

Waste disposal : Dispose in accordance with all applicable regulations. Avoid discharge to natural waters.

REGULATORY INFORMATION (ANSI Section 15)

As of the date of this MSDS, all of the components in this product are listed (or are otherwise exempt from listing) on the TSCA inventory. This product has been classified in accordance with the hazard criteria of the CPR (controlled products regulations) and the MSDS contains all the information required by the CPR.

Physical Data (ANSI Sections 1, 9, and 14)

Product Code	Description	Wt. / Gal.	VOC gr. / ltr.	% Volatile by Volume	Flash Point	Boiling Range	HMIS	DOT, proper shipping name
359F65DGF	devthane 359h (no organic haps) derrick green	9.02	291.43	34.96	80 f	208-595	*330	UN1263, paint, 3, PGIII
379C0910	devthane 379 hs converter	9.40	112.85	13.00	135 f	293-293	*321	UN1866, resin solution, combustible liquid, PGIII

Ingredients Product Codes with % by Weight (ANSI Section 2)

Chemical Name	Common Name	CAS. No.	359F65DGF	379C0910
4-heptanone, 2,6-dimethyl-	diisobutyl ketone	108-83-8	1-5	
ethane, 1,1',1''-methylidenetris(oxy)-tris-	ethyl orthoformate	122-51-0	1-5	
acetic acid, butyl ester	butyl acetate	123-86-4	5-10	5-10
c.i. pigment green 7	phthalo green pigment	1328-53-6	1-5	
benzene, dimethyl-	xylene	1330-20-7	.1-1.0	.1-1.0
titanium oxide	titanium dioxide	13463-67-7	1-5	
2-propenoic acid, 2-methyl-, 2-hydroxyethyl ester, polymer with ethenylbenzene, 2-ethylhexyl 2-propeno and methyl 2-methyl-2-propenoate	acrylic polymer	26916-05-2	40-50	
hexane, 1,6-diisocyanato-, homopolymer	aliphatic polyisocyanate	28182-81-2		90-95
formaldehyde	formaldehyde	50-00-0	LT .01	
c.i. pigment yellow 42	yellow iron oxide	51274-00-1	1-5	
acetic acid, 1,1-dimethylethyl ester	tert-butyl acetate	540-88-5	1-5	
butanamide, 2-((2-methoxy-4-nitrophenyl)azo) -n-(2-methoxyphenyl)-3-oxo-	pigment yellow 74	6358-31-2	1-5	
solvent naphtha (petroleum), light aromatic	light aromatic solvent naphtha	64742-95-6		1-5
1-butanol	n-butanol	71-36-3	1-5	
propanoic acid, 3-ethoxy-, ethyl ester	ethyl 3-ethoxypropionate	763-69-9	5-10	
sulfuric acid, barium salt	barium sulfate	7727-43-7	1-5	
castor oil	castor oil, raw	8001-79-4	10-20	
hexane, 1,6-diisocyanato-	hexamethylene diisocyanate	822-06-0		.1-1.0
acetic acid, c6-8-branched alkyl esters	oxo-heptyl acetate	90438-79-2	1-5	
benzene,1,2,4-trimethyl-	pseudocumene	95-63-6	.1-1.0	1-5
anti-settling agent	anti-settling agent	Sup. Conf.	1-5	
polyamide	rheological additive	Sup. Conf.	1-5	

Chemical Hazard Data (ANSI Sections 2, 8, 11, and 15)

		ACGIH-TLV				OSHA-PEL				S.R. Std.	S2	S3	CC					
Common Name	CAS. No.	8-Hour TWA	STEL	C	S	8-Hour TWA	STEL	C	S					H	M	N	I	O
diisobutyl ketone	108-83-8	25 ppm	not est.	not est.	not est.	50 ppm	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
ethyl orthoformate	122-51-0	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
butyl acetate	123-86-4	150 ppm	200 ppm	not est.	not est.	150 ppm	not est.	not est.	not est.	not est.	n	n	y	n	n	n	n	n
phthalo green pigment	1328-53-6	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
xylene	1330-20-7	100 ppm	150 ppm	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	y	n	n	n	n
titanium dioxide	13463-67-7	10 mg/m3	not est.	not est.	not est.	10 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	y	y	n
acrylic polymer	26916-05-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
aliphatic polyisocyanate	28182-81-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
formaldehyde	50-00-0	not est.	not est.	0.3 ppm	not est.	0.75 ppm	2 ppm	not est.	not est.	not est.	y	y	y	y	n	y	y	y
yellow iron oxide	51274-00-1	5 mg/m3	not est.	not est.	not est.	10 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
tert-butyl acetate	540-88-5	200 ppm	not est.	not est.	not est.	200 ppm	not est.	not est.	not est.	not est.	n	n	y	n	n	n	n	n
pigment yellow 74	6358-31-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
light aromatic solvent naphtha	64742-95-6	not est.	not est.	not est.	not est.	500x ppm	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
n-butanol	71-36-3	20 ppm	not est.	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	n	n	n	n	n
ethyl 3-ethoxypropionate	763-69-9	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
barium sulfate	7727-43-7	10 mg/m3	not est.	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
castor oil, raw	8001-79-4	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
hexamethylene diisocyanate	822-06-0	0.005 ppm	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	y	y	y	n	n	n	n
oxo-heptyl acetate	90438-79-2	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
pseudocumene	95-63-6	25 ppm	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	y	n	n	n	n	n	n
anti-settling agent	Sup. Conf.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
rheological additive	Sup. Conf.	10 mg/m3	not est.	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n

Footnotes:

C=Ceiling - Concentration that should not be exceeded, even instantaneously.

S=Skin - Additional exposure, over and above airborn exposure, may result from skin absorption.

n/a=not applicable
not est=not established
CC=CERCLA Chemical

ppm=parts per million
mg/m3=milligrams per cubic meter
Sup Conf=Supplier Confidential

S2=Sara Section 302 EHS
S3=Sara Section 313 Chemical
S.R.Std.=Supplier Recommended Standard

H=Hazardous Air Pollutant, M=Marine Pollutant
P=Pollutant, S=Severe Pollutant
Carcinogenicity Listed By:
N=NTP, I=IARC, O=OSHA, y=yes, n=no



MATERIAL SAFETY DATA SHEET

prepared 08/02/04

ORGANIC ZINC-RICH EPOXY PRIMER

ICI Paints North America 925 Euclid Avenue Cleveland, Ohio 44115 EMERGENCY TELEPHONE NO. (800) 545-2643

HAZARDS IDENTIFICATION (ANSI Section 3)

Primary route(s) of exposure : Inhalation, skin contact, eye contact, ingestion.

Effects of overexposure :

Inhalation : Irritation of respiratory tract. Prolonged inhalation may lead to mucous membrane irritation, fatigue, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, diarrhea, abdominal pain, chest pain, blurred vision, flu-like symptoms, coughing, sneezing, difficulty with speech, apathy, central nervous system depression, anesthetic effect or narcosis, difficulty of breathing, allergic response, fever and chills, tremors, abnormal blood pressure, severe lung irritation or damage, liver damage, kidney damage, pulmonary edema, pneumoconiosis, loss of consciousness, respiratory failure, asphyxiation, death. Possible sensitization to respiratory tract.

Skin contact : Irritation of skin. Prolonged or repeated contact can cause dermatitis, defatting, blistering, allergic response, severe skin irritation, severe skin irritation or burns. Possible sensitization to skin.

Eye contact : Irritation of eyes. Prolonged or repeated contact can cause conjunctivitis, blurred vision, tearing of eyes, redness of eyes, severe eye irritation, severe eye irritation or burns, corneal injury.

Ingestion : Ingestion may cause lung inflammation and damage due to aspiration of material into lungs, mouth and throat irritation, drowsiness, dizziness and/or lightheadedness, headache, uncoordination, nausea, vomiting, diarrhea, gastro-intestinal disturbances, abdominal pain, visual disturbances, apathy, central nervous system depression, anesthetic effect or narcosis, burns of the mouth, throat, stomach, liver damage, kidney damage, pulmonary edema, loss of consciousness, respiratory failure, death.

Medical conditions aggravated by exposure : Eye, skin, respiratory disorders, lung disorders, asthma-like conditions, respiratory disorders.

FIRST-AID MEASURES (ANSI Section 4)

Inhalation : Remove to fresh air. Restore and support continued breathing. Get emergency medical attention. Have trained person give oxygen if necessary. Get medical help for any breathing difficulty.

Skin contact : Wash thoroughly with soap and water. If any product remains, gently rub petroleum jelly, vegetable or mineral/baby oil onto skin. Repeated applications may be needed. Remove contaminated clothing. Wash contaminated clothing before re-use. Dispose of contaminated leather items, such as shoes and belts. If irritation occurs, consult a physician.

Eye contact : Flush immediately with large amounts of water, especially under lids for at least 15 minutes. If irritation or other effects persist, obtain medical treatment.

Ingestion : If swallowed, obtain medical treatment immediately.

FIRE-FIGHTING MEASURES (ANSI Section 5)

Fire extinguishing media : Dry chemical or foam water fog. Carbon dioxide. Closed containers may explode when exposed to extreme heat or fire. Vapors may ignite explosively at ambient temperatures. Vapors are heavier than air and may travel long distances to a source of ignition and flash back. Vapors can form explosive mixtures in air at elevated temperatures. Closed containers may burst if exposed to extreme heat or fire. May decompose under fire conditions emitting irritant and/or toxic gases.

Fire fighting procedures : Water may be used to cool and protect exposed containers. Firefighters should use full protective clothing, eye protection, and self-contained breathing apparatus. Self-contained breathing apparatus recommended.

Hazardous decomposition or combustion products : Carbon monoxide, carbon dioxide, oxides of nitrogen, oxides of sulfur, ammonia, aldehydes, toxic gases, barium compounds. Cyanides.

ACCIDENTAL RELEASE MEASURES (ANSI Section 6)

Steps to be taken in case material is released or spilled : Comply with all applicable health and environmental regulations. Eliminate all sources of ignition. Ventilate area. Ventilate area with explosion-proof equipment. Spills may be collected with absorbent materials. Use non-sparking tools. Evacuate all unnecessary personnel. Place collected material in proper container. Complete personal protective equipment must be used during cleanup. Large spills - shut off leak if safe to do so. Dike and contain spill. Pump to storage or salvage vessels. Use absorbent to pick up excess residue. Keep salvageable material and rinse water out of sewers and water courses. Small spills - use absorbent to pick up residue and dispose of properly.

HANDLING AND STORAGE (ANSI Section 7)

Handling and storage : Store below 80f. Store below 100f (38c). Keep away from heat, sparks and open flame. Keep away from direct sunlight, heat and all sources of ignition.

Other precautions : Use only with adequate ventilation. Do not take internally. Keep out of reach of children. Avoid contact with skin and eyes, and breathing of vapors. Wash hands thoroughly after handling, especially before eating or smoking. Keep containers tightly closed and upright when not in use. Empty containers may contain hazardous residues. Ground equipment when transferring to prevent accumulation of static charge.

EXPOSURE CONTROLS/PERSONAL PROTECTION (ANSI Section 8)

Respiratory protection : Control environmental concentrations below applicable exposure standards when using this material. When respiratory protection is determined to be necessary, use a NIOSH/MSHA (Canadian z94.4) Approved elastomeric sealing- surface facepiece respirator outfitted with organic vapor cartridges and paint spray (dust/mist) prefilters. Determine the proper level of protection by conducting appropriate air monitoring. Consult 29CFR1910.134 For selection of respirators (Canadian z94.4).

Ventilation : Provide dilution ventilation or local exhaust to prevent build-up of vapors. Use explosion-proof equipment. Use non-sparking equipment.

Personal protective equipment : Eye wash, safety shower, safety glasses or goggles. Impervious gloves, impervious clothing, face shield, apron.

STABILITY AND REACTIVITY (ANSI Section 10)

Under normal conditions : Stable see section 5 fire fighting measures

Materials to avoid : Oxidizers, acids, reducing agents, bases, aldehydes, ketones, halogens, amines, carbon tetrachloride (at elevated temperatures), aluminum, nitric acid, metal compounds, lewis acids, mineral acids.

Conditions to avoid : Elevated temperatures, moisture, contact with oxidizing agent, storage near acids, sparks, open flame, ignition sources.

Hazardous polymerization : Will not occur may polymerize in presence of aliphatic amines.

TOXICOLOGICAL INFORMATION (ANSI Section 11)

Supplemental health information : Contains a chemical that is moderately toxic by ingestion. Contains a chemical that may be absorbed through skin. Excessive inhalation of fumes may lead to metal fume fever characterized by a metallic taste in mouth, excessive thirst, coughing, weakness, fatigue, muscular pain, nausea, chills and fever. Notice - reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. Other effects of overexposure may include toxicity to liver, kidney, central nervous system, blood.

Carcinogenicity : The international agency for research on cancer (IARC) has evaluated ethylbenzene and classified it as a possible human carcinogen (group 2b) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans. In a 2 year inhalation study conducted by the national toxicology program (NTP), ethylbenzene vapor at 750 ppm produced kidney and testicular tumors in rats and lung and liver tumors in mice. Genetic toxicity studies showed no genotoxic effects. The relevance of these results to humans is not known.

Reproductive effects : High exposures to xylene in some animal studies, often at maternally toxic levels, have affected embryo/fetal development. The significance of this finding to humans is not known.

Mutagenicity : Triethylenetetramine has demonstrated weak mutagenic activity in standard in vitro tests, and has caused embryo- fetal toxicity and fetal malformations when fed to rats. Triethylenetetramine did not exhibit carcinogenic potential in life-time mouse skin painting studies.

Teratogenicity : No teratogenic effects are anticipated

ECOLOGICAL INFORMATION (ANSI Section 12)

No ecological testing has been done by ICI paints on this product as a whole.

DISPOSAL CONSIDERATIONS (ANSI Section 13)

Waste disposal : Dispose in accordance with all applicable regulations. Avoid discharge to natural waters.

REGULATORY INFORMATION (ANSI Section 15)

As of the date of this MSDS, all of the components in this product are listed (or are otherwise exempt from listing) on the TSCA inventory. This product has been classified in accordance with the hazard criteria of the CPR (controlled products regulations) and the MSDS contains all the information required by the CPR.

Physical Data (ANSI Sections 1, 9, and 14)

Product Code	Description	Wt. / Gal.	VOC gr. / ltr.	% Volatile by Volume	Flash Point	Boiling Range	HMIS	DOT, proper shipping name
313B0250	do not use, use dc313b0250d instead	24.77	334.95	41.44	90 f	244-304	*231	paint, 3, UN1263, PGIII
313C0910	catha coat 313 organic zinc-rich epoxy primer clear converter	7.54	338.66	41.11	110 f	243-304	*320	paint, combustible liquid, UN 1263, PGIII

Ingredients Product Codes with % by Weight (ANSI Section 2)

Chemical Name	Common Name	CAS. No.	313B0250	313C0910
benzene, ethyl-	ethylbenzene	100-41-4	.1-1.0	
2-heptanone	methyl amyl ketone	110-43-0	5-10	20-30
1,2,-ethanediamine, n,n'-bis(2-aminoethyl)-	triethylenetetramine	112-24-3		1-5
zinc oxide	zinc oxide	1314-13-2	1-5	
benzene, dimethyl-	xylene	1330-20-7	1-5	
oxirane,2,2'-(((1-methylethylidene) bis (4,1-phenyleneoxymethylene))) bis-	diglycidyl ether of bisphenol a	1675-54-3	1-5	
phenol, 4,4'-(1-methylethylidene)bis-, polymer with 2,2'-((1-methylethylidene)bis (4,1-phenyleneoxymethylene))bis(oxirane)	epoxy resin	25036-25-3	1-5	
fatty acids, c18-unsatd., dimers, reaction products with polyethylenepolyamines	polyamide resin	68410-23-1		40-50
1-butanol	n-butanol	71-36-3		10-20
zinc	zinc	7440-66-6	70-80	
sulfuric acid, barium salt	barium sulfate	7727-43-7	1-5	
amine adduct	amine adduct	Sup. Conf.		10-20

Chemical Hazard Data (ANSI Sections 2, 8, 11, and 15)

		ACGIH-TLV				OSHA-PEL												
Common Name	CAS. No.	8-Hour TWA	STEL	C	S	8-Hour TWA	STEL	C	S	S.R. Std.	S2	S3	CC	H	M	N	I	O
ethylbenzene	100-41-4	100 ppm	125 ppm	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	y	n	n	y	n
methyl amyl ketone	110-43-0	50 ppm	not est.	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
triethylenetetramine	112-24-3	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
zinc oxide	1314-13-2	2 mg/m3	10 mg/m3	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	y	n	n	n	n	n	n
xylene	1330-20-7	100 ppm	150 ppm	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	y	n	n	n	n
diglycidyl ether of bisphenol a	1675-54-3	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
epoxy resin	25036-25-3	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
polyamide resin	68410-23-1	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
n-butanol	71-36-3	20 ppm	not est.	not est.	not est.	100 ppm	not est.	not est.	not est.	not est.	n	y	y	n	n	n	n	n
zinc	7440-66-6	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	y	y	n	n	n	n	n
barium sulfate	7727-43-7	10 mg/m3	not est.	not est.	not est.	5 mg/m3	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n
amine adduct	Sup. Conf.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	not est.	n	n	n	n	n	n	n	n

Footnotes:
C=Ceiling - Concentration that should not be exceeded, even instantaneously.
S=Skin - Additional exposure, over and above airborn exposure, may result from skin absorption.
n/a=not applicable
not est=not established
CC=CERCLA Chemical
ppm=parts per million
mg/m3=milligrams per cubic meter
Sup Conf=Supplier Confidential
S2=Sara Section 302 EHS
S3=Sara Section 313 Chemical
S.R.Std.=Supplier Recommended Standard
H=Hazardous Air Pollutant, M=Marine Pollutant
P=Pollutant, S=Severe Pollutant
Carcinogenicity Listed By:
N=NTP, I=IARC, O=OSHA, y=yes, n=no



第 3 章：安装

概述

本章对推荐使用的 Derrick DE-1000 GBD 离心机安装步骤进行描述。离心机装运时已完全装配完毕。但是，为确保运输安全，旋转总成用运输托架加以支撑。旋转总成必须落到底座上，然后将主轴承轴台牢固地固定到底座上。

安全

设备安装和操作之前，必须阅读并领会本手册**所有**安全信息。设备安装、操作和维护的警示牌在手册第 2 章中做了概括。

安装之前，请查看本章关于设备搬运的相关信息。提升或移动设备前，特别要注意关于“提升点”和使用舒展杆的信息。

如果不遵守正确的设备搬运规程，可能导致人员伤亡和/或设备受损。

	**警示! 提升时要确保设备正确地平衡和定位，以防损坏设备部件。只能在指定的起吊点固定吊绳。起吊时不能将吊绳固定在任何其它位置。**
	**警示! 确保起吊装置的起吊能力足以安全处理待吊设备的重量。离心机要缓慢平稳地放低就位，落地动作过猛会使设备受损。**
	**警示! 离心机定位到最终安装现场之前不得拆除运输托架。**

安装顺序

以下是离心机的安装步骤和顺序。根据用户实际使用的安装设施以及同类设备的安装经验，所列安装顺序可能会有变动调整。

1. 设备安装和操作之前，首先要阅读并领会第 2 章中的所有安全信息。
2. 在安装现场对设备进行定位和找平。
3. 拆除运输件，将旋转总成落到底座上并与底座牢固固定。
4. 调整传动皮带。
5. 连接液体排放管线。
6. 如果使用排料槽，请将排料槽与固体排料斜槽连接。
7. 安装进料管，将挠性进料管与进料管连接。
8. 连接设备电源，并将进料泵与离心机控制回路连接。
9. 起动和操作步骤请参见第 4 章——操作指导。

现场准备和清理要求

放置设备前，要确定设备现场有电，并且已接好进料管和排料斜槽（若有）。另外还要确认设备周围有充分的空间。请按以下要求对安装现场进行准备：

1. 提供充分空间进行以下工作：
    a. 电气盘上操控。
    b. 打开和关闭顶盖。
    c. 对主轴承和齿轮箱轴承进行润滑。
    d. 检查齿轮箱和驱动电机离合器的油位。
    e. 连接和断开进料和排料管线。
2. 确认安装结构已正确定位并且足以支撑离心机的重量。
3. 检查现场电源是否满足离心机对电源的要求。
4. 检查排液管的法兰是否与设备排液连接口匹配。

设备搬运



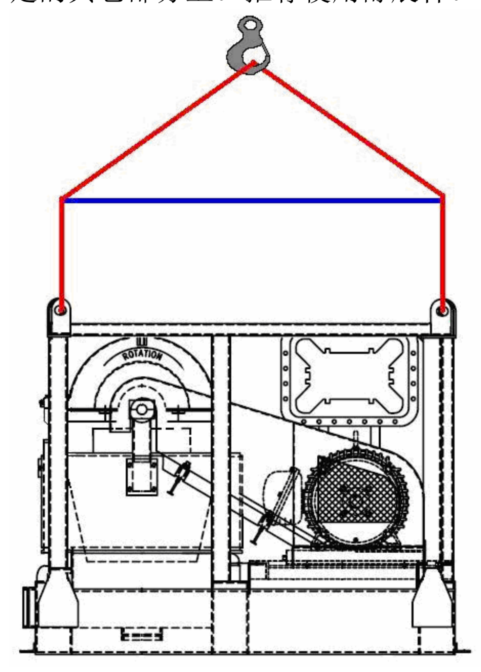
警示! 设备提升时要使用舒展杆，以防设备提升时受损。

	**警示!** 提升时要确保设备正确地平衡和定位，以防损坏设备部件。只能在标明的起吊点固定吊绳。起吊时不能将吊绳固定在任何其它位置。
	**警示!** 确保起吊装置的起吊能力足以安全处理待吊设备的重量。
	**警示!** 设备定位到最终安装现场之前不得拆除运输托架。
	**警示！** 使用过顶起重装置时，要使用所提供的四个提升点。

离心机运输时已完全装配完毕，并且安装在一个运输滑架上。机器上贴有注明装置重量的标签。设备重量和其它技术数据可参见手册第 8 章的总体配置图。

当离心机仍然固定在运输滑架上时，可以在地面使用升降叉车进行搬运。当设备与运输滑架分离之后，则要求使用过顶提升装置进行搬运。

设备的框架上有四个加强的提升吊耳，用来连接过顶提升装置（见图 3-1）。提升点位置标注有“仅在此处提升（**LIFT HERE ONLY**）”字样。不得将吊绳或类似提升工具系在电机上或装置未指定的其它部分上。推荐使用舒展杆。



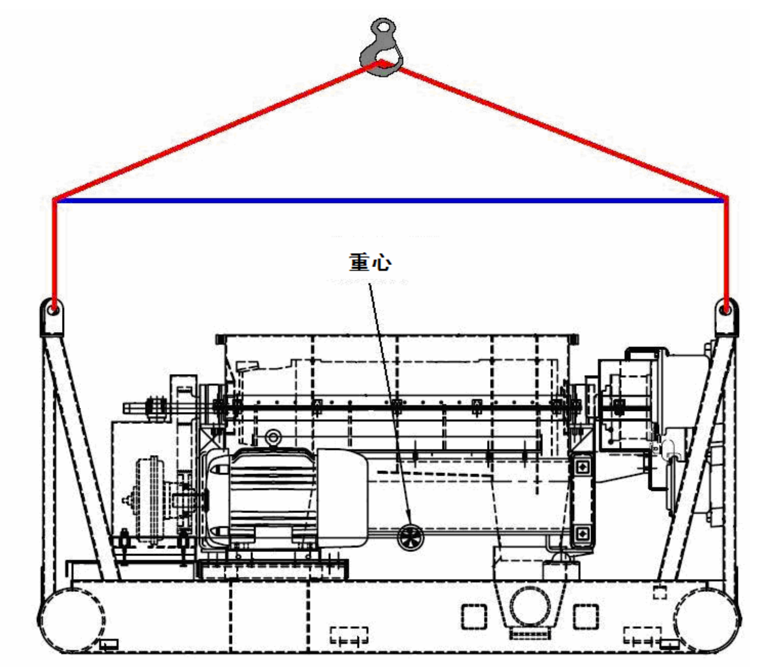
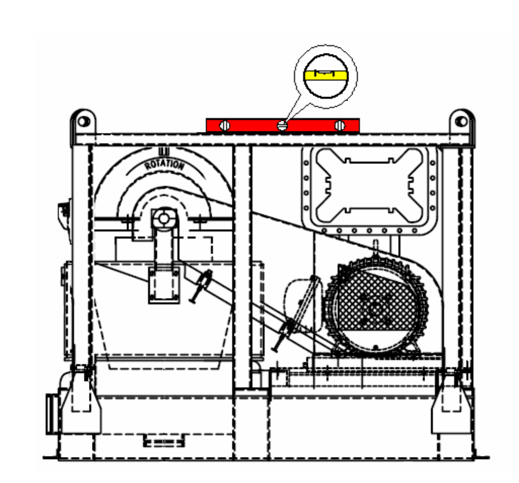


图 **3-1**：提升方案

设备定位和找平

为使离心机达到满意的工作效果，安装时必须对其找平。设备必须沿长宽两边找平（见图 3-2）。推荐使用双脚水平仪或鱼雷尺。对设备做垫平处理时要求使用不可压缩的垫片。



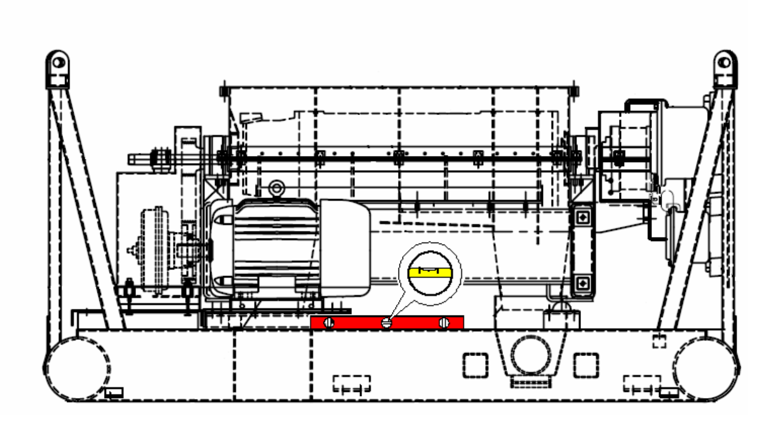


图 3-2：离心机找平

放低并固定旋转装置总成



注意！ 支撑旋转总成的运输托架拆除后要妥善保存。当设备发生搬动移位时必须重新装好托架，以防旋转总成发生损坏。

运输托架可以防止搬动时轴承受损，橡皮带可保护轴台的安装面。离心机经过最终定位和找平之后，必须将运输托架和盖板拆除，并将旋转总成牢固地固定在底座上。

每个运输件都标有"**起动前必须拆除（DISCONNECT BEFORE STARTUP）**"字样。请按以下步骤拆除运输件：

1. 拆除皮带防护板和齿轮箱防护板。
2. 使用一吨的葫芦将旋转总成缓慢均匀地提升起大约 5”。
3. 拆除旋转总成下面的运输托架。
4. 拆除旋转总成和轴承轴台下面的运输橡皮带(图 3-3)。
5. 使用合适的溶剂对轴台安装面和对正销孔进行清洁。检查是否有任何缺口或毛刺并清除。
6. 将旋转总成缓慢地落下直到轴台与底座接触，此时不要松开葫芦。
7. 在轴台螺栓和锥形对正销上涂上防粘剂，然后插入轴台。轻敲对正销直到到位为止。.
8. 用手拧紧轴台螺栓，然后松开葫芦。根据第 5 章中适用的扭矩技术要求紧固轴台螺栓。
9. 排污口工厂设定为 3.4，如有必要，可对其进行调整。

10. 关好箱盖，均匀用力上紧所有盖板螺栓。从中间的螺栓开始，按照顺序一直拧到最末端的螺栓。
11. 用手旋转转鼓，确认它在转动时没有阻力或摩擦。

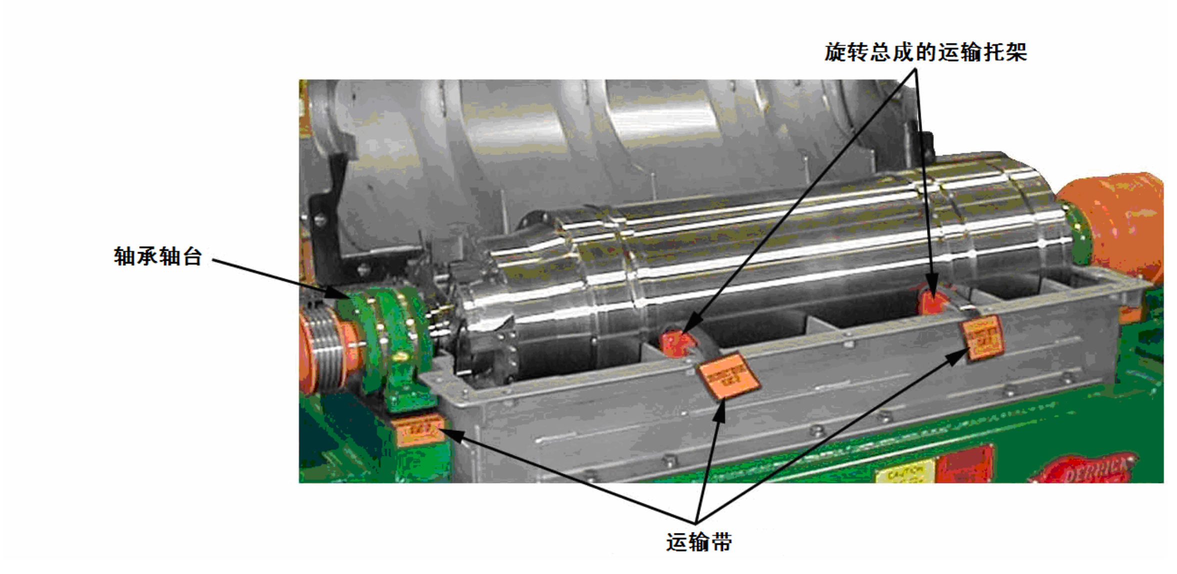


图 **3-3**：运输件的位置

12. 根据第 5 章“预防性维护”的内容调整传动皮带的张紧度。
13. 安装皮带防护板和齿轮箱防护板。

进料和排料管连接

为有效隔离振动，进料管必须连接挠性管。离心机停车之前要求使用新水对其进行冲洗。连接冲洗管时，要在带有截流阀的进料管上安装 T 形连接件，以便在进料管或冲洗管之间自由选择（见图 3-4）。使用截流阀是为了防止冲洗水流回离心机进料管。

如果使用排液管（由用户提供），也要求使用挠性管来隔离振动。由于排饼中缺少自由液体，因此非常厚重粘稠，离心机应当安装在易于接收固体排料的容器的上方。如果无法做到，则需要安装滑槽或斜槽传输固体物料。要求传输槽至少 45°角，以确保其自洁性。否则必须配备清洗系统，以防物料堆积。

进料泵

用户必须使用可达 15HP 的正排量进料泵来保证向离心机输送泥浆。泵必须按照本资料所述与离心机电气控制系统连接，以便其运行情况能够受到离心机的控制。

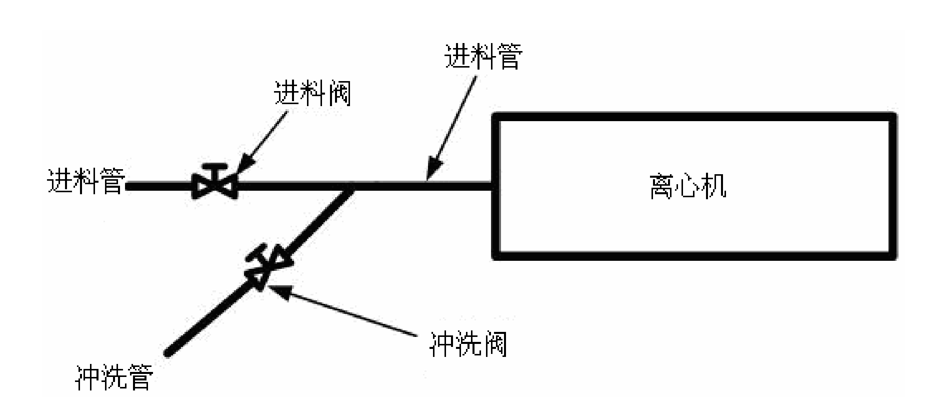


图 3-4：进料和冲洗管连接

电源连接

要求使用三相电源并做接地连接。另外，用户的进料泵必须与离心机控制回路连接。其它所有连接均已在出厂前完成。请根据图 3-5 将工厂的三相电源及用户进料泵与电气接线盒连接。如需更多帮助和有关电气连接的信息，请参见第 8 章中的电气图。

离心机馈电是三相、50 / 60Hz、用户规定电压等级的电源。驱动电机不是双绕组，必须在设计的电压等级下进行操作。有关电机的技术规格，请参见第 7 章的内容。

	**警示! 驱动电机必须在指定的电压等级条件下工作。**
	**警示! 可能有高压。确保设备的熔断电源是断开的。电气连接时，要切断电源并挂牌上锁，以防意外送电。**
	**警示! 电气连接必须符合国家电气法规（NEC）和所有适用的地方性法规。违反这些法规规定会造成可能导致人员受伤和设备损坏的不安全条件。要确保所有电气和导线管连接均牢固可靠。**

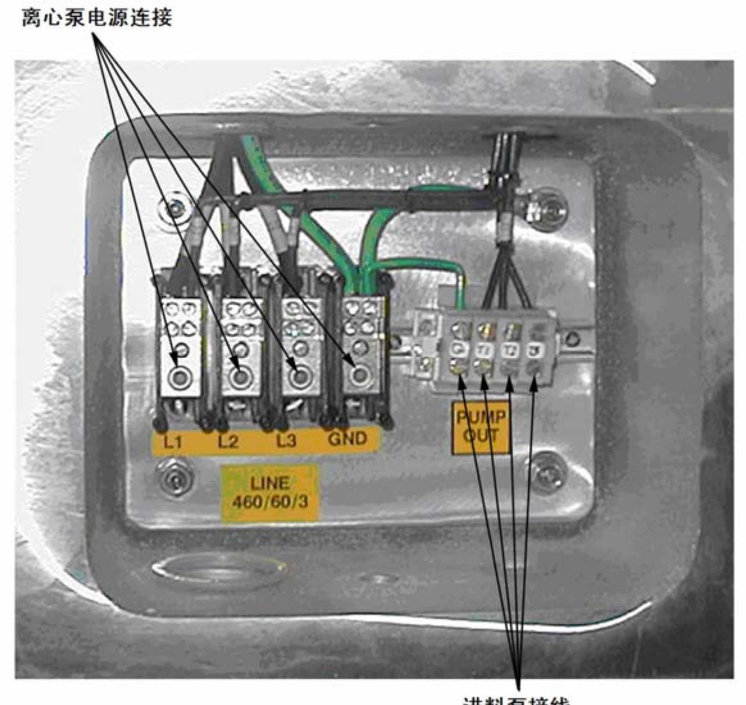


图 3-5：电源与进料泵接线

该设备要求使用熔断主电源。设备的熔断接线必须大小合适并且满足国家电气法规（NEC）和其它所有适用的州/当地法规要求。

接线的补充要求如下：

1. 熔断装置要具有充足的断开能力，要能够消除电源系统最大的电流故障。
2. 电源接线盒中的接地端必须与已知地线连接。
3. 进料泵接线要按上图所示与接线盒中的端子连接。进料泵起动器可使进料泵驱动电机操作达到 15HP。

设备起动

离心机初次起动和操作步骤请参见第 4 章的内容。



警示！设备装有运输件时不得运行。



第 4 章：操作指导

概述

本章介绍离心机初次起动和正常起动、操作、停车和紧急停车的步骤。这些操作只能由经过培训并且胜任高速旋转设备操作的人员执行。

操作安全

	**警示!** 对设备进行操作和维护之前，所有相关人员必须先阅读并领会手册中的所有安全信息。
	**警示!** 设备起动之前，首先要确保所有防护装置均已安装到位且牢固可靠，并且所有人员均已远离设备。
	**警示!** 离心机起动之前，首先要确保所有运输托架均已拆除，所有轴承轴台均已正确紧固。
	**警示!** 打开顶盖或拆除护板之前，必须让机器惯性滑行直至完全停车。
	**警示!** 如果出现异常噪音或振动时，不得对离心机进行操作。必须随时确认振动开关和其它安全装置工作正常。

初次起动

设备第一次起动时或者设备长时间退出流程后再次起动时，都要按照初次起动步骤进行。

初次起动之前，请检查并确认以下几点：

1. 所有工具、资料和运输件已经清除，现场没有妨碍操作的物品。
2. 所有人员均远离设备。.

初次走动的步骤	
步	步骤
1	确认所有操作人员和维护人员均已阅读并领会第 2 章中的全部操作和安全信息。
2	确认设备已正确安装完毕，所有运输托架均已拆除，并且轴承轴台均已按照规定的扭矩紧固妥当。
3	检查安装现场的辅助设备和公用设施与是否齐备。.
4	检查机盖是否闭合，机盖上的所有螺栓是否完全紧固，以及所有防护板是否就位。.
5	根据以下正常起动步骤起动离心机。

正常起起

设备每次起动都应按以下步骤进行：

正常起动步骤	
步	步骤
1	检查机盖是否闭合，机盖上的所有螺栓是否完全紧固，以及所有防护板是否就位。
2	用手旋转转鼓总成，检查旋转总成是否能够自由转动且感觉不到摩擦。
3	设备通电之前，确认所有人员均已远离离心机并且所有防护板均已就位。
4	按下 CENTRIFUGE ON（离心机开动）按钮起动离心机驱动电机。确认朝液体转鼓头方向看时，传输装置呈逆时针方向旋转。
5	按下 PUMP ON（泵开动）按钮起动进料泵将物料缓慢引入离心机。

操作

连续监控液体和固体的排出情况，以便确定离心机的操作状态。发现固体排料量不足和/或过载安全离合器反复脱扣环等异常现象时，要采取措施予以纠正。注意改变进料速率或调整液池深度不会立即使离心机的工况发生变化。若要离心机的液体和/或固体排放情况发生变化，需要离心机连续运行一个或多个小时。连续监控进料情况和液体/固体排放情况，以便检查传输装置是否有过载的发展趋势。如果出现过载会使过载安全离合器脱扣跳闸。

以下参数会影响离心机的操作：

- 进料速率；
- 液池的深度；
- 转鼓的速度；
- 传输装置的速度。

为了优化离心机的操作，防止过载安全离合器总成脱扣，应当对进料速率和液池深度进行调整。脱扣表明传输装置运送固体时负荷过重。传输装置的速度由齿轮传动比决定，直接受转鼓速度变化的影响。因此，改变电机皮带轮的直径可以改变转鼓速度和相应的传输装置速度：直径越大，转鼓速度越快，直径越小，速度则越慢。电机皮带轮的直径只能在调整过进料速率和液池深度后仍无法使离心机达到令人满意的工况性能时才进行调整。

改变进料速率和/或液池深度应当使排出液达到要求的澄清度并使固体达到要求的干燥度。进料速率可以离心机工作时进行调整，但液池深度只能在离心机停车、闭锁电源并挂牌上锁后才能进行调整。

液体转鼓与传输装置之间的差动速度只能通过更换齿轮箱进行调整和修改。有两种齿轮传动比——52:1 和 125:1。只能在其它方式调整都无法令离心机操作达到令人满意的效果并且向 Derrick 服务部门咨询之后，才能改变为另一种齿轮箱传动比。

进料速率调整

如果料浆稀薄，提高进料速率可以加快物料处理速度。但是，随着进料速率的提高，操作人员必须检查传输装置是否能够正常传送固体物料。如果过载安全离合器反复脱扣，则应当降低进料速率。

液池深度调整

液池深度只能在离心机完全停止运行并且闭锁电源后才能进行调整。基于这个原因，液池深度通常在调整过进料速率之后才进行调整。液池深度的工厂设定值为 3.4，在与进料速率调整结合使用时，一般能够取得令人满意的结果。但是，如果调整进料速率达不到需要的结果，改变液池深度会有所帮助。

液体转鼓头一侧配备有四个可调节的排污口（见图 4-1），以便对液池深度进行设定；所有排污口的设定必须相同。液池深度越高，允许停留在转鼓里的液体量越多，因而沉降时间越长。但是，液池深度太高会缩小转鼓固料排出端的砂滩面积，造成所排固料的含湿量较高。

按以下方式调整液池深度：



警示！除非转鼓处于完全静止的状态，否则不得打开离心机机盖或对离心机进行任何调整/维护。

1. 按照本章后面描述的正常停车步骤执行离心机的停车、切断电源和挂牌上锁。
2. 打开机箱顶盖。
3. 松开固定安装环与液体转鼓头用的三颗螺钉，转动排污口直至根据对正标记找好它所需的设定值，然后上紧螺钉。所有四个排污口都必须设定到相同的位置。
4. 调整完成后关闭机箱顶盖。

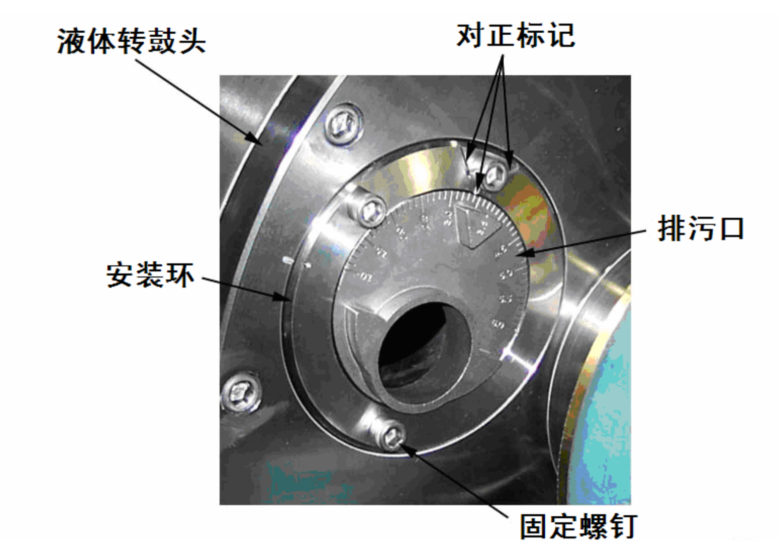


图 **4-1**：排污口的调整

转鼓和传输装置速度调整

转鼓速度只能通过更换电机皮带轮进行修改。由于传输装置的速度与转鼓的速度成正比，因此提高转鼓速度也可以提高传输装置的速度。下表列出了现有的电机皮带轮、对应的转鼓速度以及正确的传动皮带尺寸。转鼓速度越快，固体送出离心机的速度越快，但处理速度太快会造成排饼含湿量升高。为了减少排饼中的含湿量，料浆送出固体排料端之前必须增加在转鼓中的停留时间，这是因为固体沉降处理所要求的时间较长。相反，要从厚重的进料泥浆中最大程度地分离液体，则有必要降低转鼓速度。

由于改变转鼓速度要求对离心机局部进行拆解，因此应当在进料速率和液池深度的调整不能达到令人满意的效果之后才进行此项调整。请参见第 5 章有关皮带轮的拆除和安装步骤的内容。

齿轮传动比

电机皮带轮直径越大，转鼓速度越高，但扭矩越小。因此，要达到适当的扭矩，可能必须降低进料速率或者提高齿轮箱传动比。例如：如果用传动比为 52:1 的齿轮箱替代 125:1 的齿轮箱，进料速率必须降低 10%，以免离心机出现过载。由于更换齿轮箱是一项大的变动，因此只能在其它所有变量调整都无法达到令人满意的效果之后，通过向 Derrick 服务部咨询后才能进行。

过载安全离合器扭矩调整

不能通过进料速率和/或液池深度调整予以纠正的过载保护频繁脱扣可能是由于过载安全保护总成的扭矩设定不正确所致。根据第 5 章的内容，检查并调整过载安全保护总成的扭矩。

DE-1000 GBD 离心机电机皮带轮与传动皮带			
皮带轮直径	转鼓速度 (RPM)	皮带轮部件号	皮带部件号
60 Hz 电机			
8”	2450	10603-00	5G3V1000
9”	2750	10603-05	5G3V1000
9.9”	3000	10603-01	5G3V1000
10.6”	3225	10603-02	5G3V1000
11.1”	3400	10603-06	5G3V1060
11.5”	3500	10603-03	5G3V1060
13.1”	4000	10603-04	5G3V1060
50 Hz 电机			
8”	2000	10603-00	5G3V1000
9”	2250	10603-05	5G3V1000
9.9”	2450	10603-01	5G3V1000
10.6”	2600	10603-02	5G3V1000
11.1”	2750	10603-06	5G3V1060
11.5”	2850	10603-03	5G3V1060
13.1”	3250	10603-04	5G3V1060

自动停车

离心机具有设备保护用的内置安全部件。这些部件确保离心机在受到损坏之前能够自动停车。以下部分介绍了这些自动停车保护部件。

振动过度

振动等级达到 2G 时将使振动开关断开离心机运行继电器的电源并使设备停车。起动时或正常运行时，由于设备壁上附着的饼料塌落或转鼓上其它失衡条件的作用，都会造成出现振动过度。重新起动设备之前，先要按下振动开关上的复位按钮，然后采用正常起动步骤进行操作。

正常起动时如果出现障碍跳闸，可一直按住复位按钮直至达到全速。

热过载

热过载可以保护离心机驱动电机和进料泵的电源回路。如果通过离心机电机起动器回路的电流过大，热过载保护装置会脱扣，使离心机运行继电器被禁用并使电机停车。如果通过泵的起动器回路的电流过大，热过载保护装置也会脱扣，断开泵起动继电器的电源并且使进料泵的电机被禁用。离心机因热过载保护脱扣而停车后如果要重新起动，应当先消除过电流原因，按下两个 RESET（复位）按钮，然后采用正常起动步骤重新起动设备。

电机过热

如果驱动电机绕组中嵌入的热电偶感应到高温，电机绕组中的电机过热保护开关会断开，使离心机运行继电器断电禁用并使电机停车。重新起动离心机之前，要让电机冷却下来，检查并消除过热原因，并采用正常起动步骤重新起动设备。

传输装置过扭矩

如果传输装置扭矩过大（52:1 齿轮箱达到 335 英寸 • 磅； 125:1 齿轮箱达到 200 英寸 • 磅），过载离合器将使传输装置与齿轮箱脱开。同时，过扭矩限制开关的常闭接点将被过载安全辊臂断开，中断驱动电机和进料泵电机的电源。松开之后，必须先对离合器手动复位（参见第 5 章），然后才能重新起动离心机。

正常停车

正常停车步骤用于控制停车操作。在进行包括清理、润滑、检查、或调整等在内的常规工作时要求设备正常停车。



警示！每天工作结束时必须对离心机彻底冲洗。如果不进行彻底冲洗，工艺物料将沉积并干燥，造成设备严重失衡。再次起动时，离心机将出现严重振动，导致自动停车。

正常停车步骤	
步	步骤
1	按下 PUMP OFF （泵关停）按钮断开离心泵进料。
2	如果停车时间超过数小时（例如一天），则要冲洗离心机料两、三分钟将固体物料清除干净。如果不冲洗干净，工艺物料将干结并造成严重的失衡问题。
3	按下 CENTRIFUGE OFF （离心机关停）按钮切断离心机电源。断开设备的熔断电源。
4	闭锁设备的电源并挂牌上锁。

紧急停车

出现紧急情况需要立即停止离心机时，请断开设备的熔断电源。



第 5 章：维护

概述

本章描述 DE-1000 GBD 离心机预防性和纠正性维护的步骤。显而易见的步骤已做省略。离心机开始维护之前，首先要对设备停车、闭锁和挂牌上锁。



警示! 可能有高压。进行设备维护之前，必须断开设备的熔断电源、分离电源并挂牌上锁。



警示！如果不佩戴安全护目镜，可能导致眼睛受重伤或者永久性失明。进行维护工作时必须一直佩戴安全护目镜。

预防性维护

预防性维护包括检查、清理和润滑工作。这些常规性工作能够确保设备实现最长使用寿命和无故障操作。本章中的维护计划有一定灵活性，应当根据用户工厂对设备的操作经验适当进行调整。维护记录应当保管好，这有助于制定预防性维护计划，并且在设备使用过程中实行监控并调整计划。

制定预防性维护计划时，要考虑以下因素：

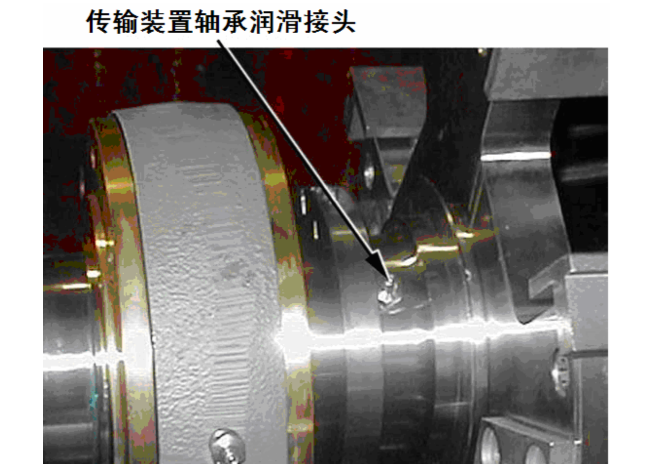
- 负载循环
- 环境温度
- 操作环境

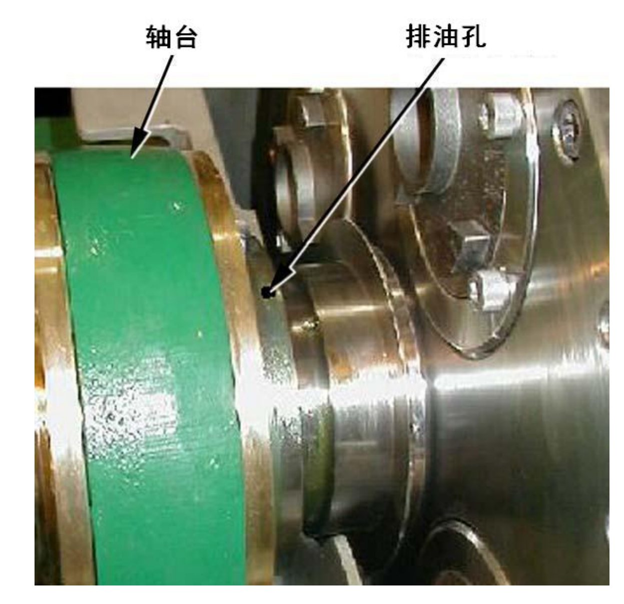
.下表列出了推荐的预防性维护计划。有关适用的润滑剂及用量，可参见下页的润滑图表。

预防性维护的计划	
工作	频率
检查进料管的连接处是否泄漏，并根据要求紧固连接夹。	每班
检查排液管的连接处是否泄漏。上紧连接件和/或补加硅酮密封剂。	每班
对旋转总成的轴承进行润滑（图 5-1）。	每班 注一次
拆下进料管，清理管内壁，然后重新安装好。	每周
注油塞对准 12 点钟的位置检查齿轮箱的油位。	每两周
检查液力偶合器的油位（图 5-2）	每两周

预防性维护（续）

预防性维护的计划	
工作	频率
检查机箱内外是否有固体物料沉积，并根据要求进行清理。	每周
对传输装置的轴承进行吹扫。	每两周
拆下皮带的盖板，检查皮带是否损坏，并检查/调整皮带的张紧度。	每月
拆下并清理抛油环的盖子。	每月
检查过载安全离合器的扭矩设定情况。	每 250 个小时
润滑过载安全离合器。	每 1000 个小时





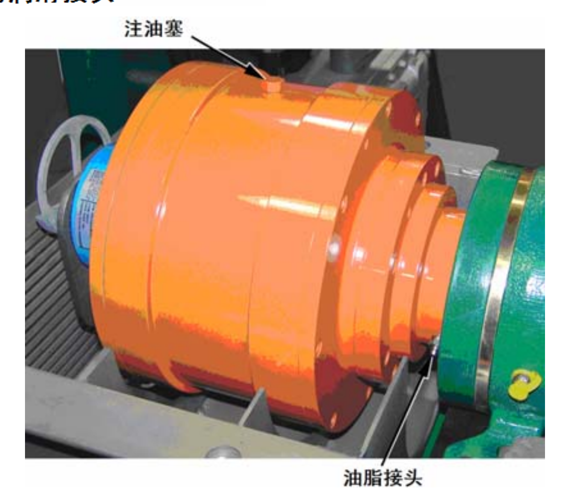


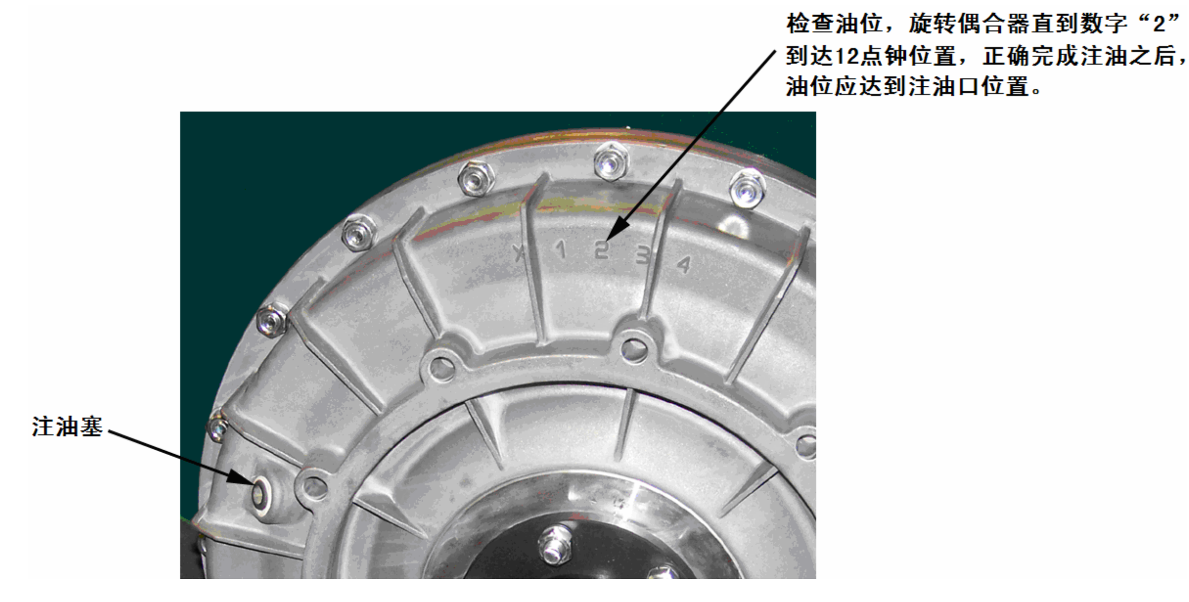
图 **5-1**：旋转总成的润滑点

液力偶合器的油位

正常情况下不需要对液力偶合器加油。如果发现油位变低，请检查装置的易熔塞处和注油塞周围是否有漏油迹象。如果注油塞出现泄漏，重新做密封处理并上紧注油塞。如果在易熔塞或其它地方发现泄漏，请与 Derrick 公司服务部门联系寻求帮助。

按以下方法检查液力偶合器的油位：

1. 旋转偶合器直到外壳上的数字“2”到达 12 点钟位置（见图 5-2）。
2. 拧下注油塞。如果油位变低，请联系 Derrick 服务部帮助确定并纠正泄漏根源，解决问题之后才能重新注油。
3. 对泄漏根源进行纠正之后，旋转偶合器直到数字“2”到达 12 点钟位置然后加入足量且规格正确的油（参见下页润滑图表的内容）使油位升高到开口处。
4. 确认油位达到注油口时，装好注油塞并拧紧。



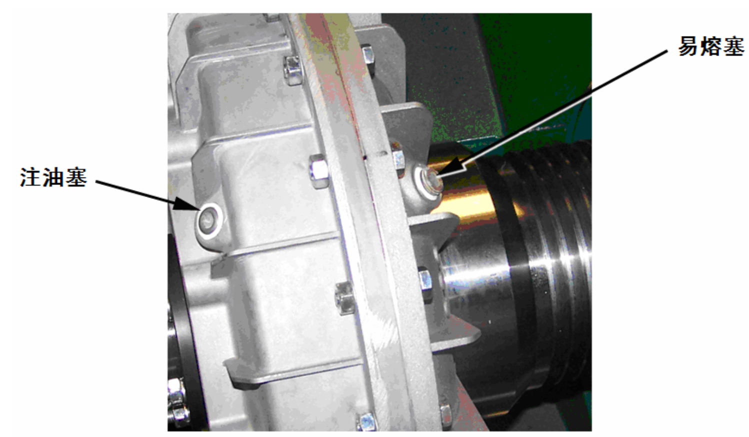


图 **5-2**：检查液力偶合器及注油

认可的润滑剂

下表列出了 Derrick 认定可以使用的离心机润滑剂。

DERRICK公司认可的适用于DE-1000 GBD离心机的润滑剂				
制造商	产品	应用	数量	温度
润滑油				
雪佛龙	GST ISO 32	液力偶合器	112 盎司 (3.3 升)	标准
美孚	合成油 SHC 626	液力偶合器	112 盎司(3.3 升)	北极
德古士	Meropa 320	齿轮箱	80 盎司(2.4 升)	标准
美孚	SHC 220	齿轮箱	80 盎司(2.4 升)	北极
油脂				
雪佛龙	SRI NLGI 2 SRI-2	主轴承和 传输装置轴承	A/R	标准
壳牌	Aeroshell 14	主轴承和 传输装置轴承	A/R	北极
Centrilube	1000 (Nyogel 760D)	仅主轴承	A/R	4000 RPM
美孚	FM 102 (食品级别)	仅传输装置轴承	A/R	标准

传动皮带的更换

如果查出传动皮带出现损坏或老化，必须及时更换。按以下步骤更换皮带：

1. 松开固定进料管夹的螺钉，将进料管滑出。
2. 松开锁闩，拆下保护皮带轮和液力偶合器的皮带防护板。
3. 松开固定驱动电机底脚与底座的防松螺母（见图 5-3），逆时针方向旋转调整螺栓松开皮带，然后将皮带滑出皮带轮。
4. 用直尺检查皮带轮的平行对正情况。调整皮带轮的位置，使平行对正误差在 0.0156 英寸以内。
5. 将新的皮带安装到驱动电机和转鼓总成的皮带轮上。

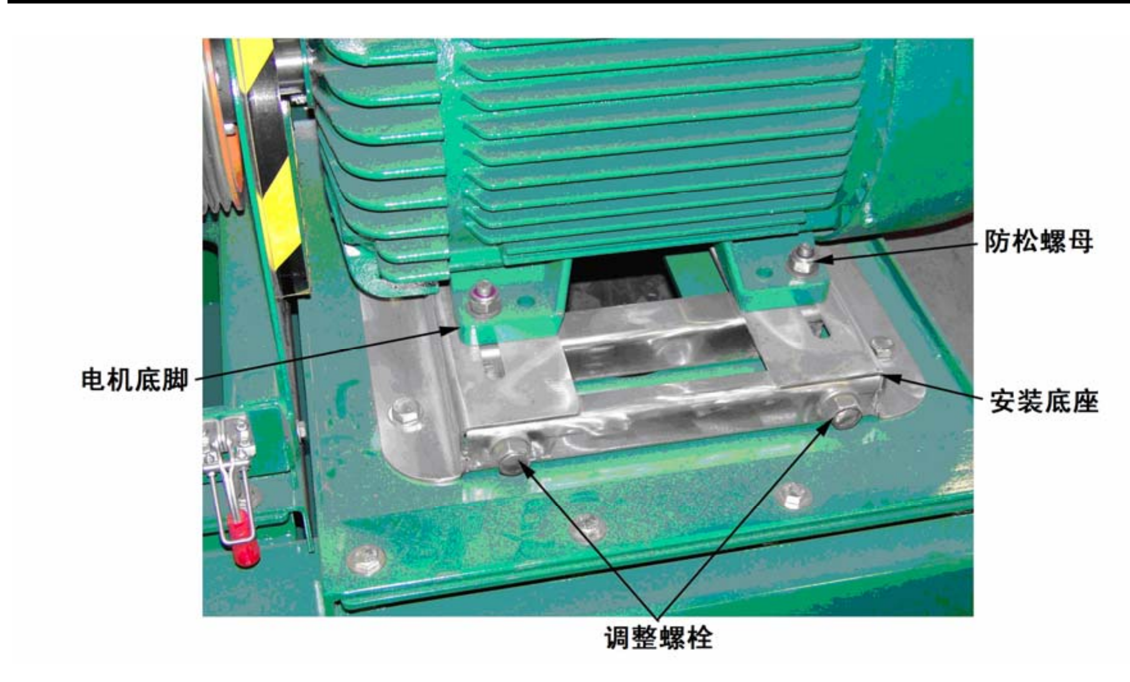


图 **5-3**：传动皮带张紧度的调整

6. 上紧电机安装可调节螺栓对皮带作用充分的张紧力，以便在皮带中心点作用 20 磅的力时皮带能够达到 5/8”的挠度。设定好正确的张紧度之后，上紧电机安装螺栓。
7. 安装皮带防护板，并将锁闩闩到位。
8. 将进料管插入进料管支架直到其肩部完全与支架接触。根据本章“扭矩紧固件的技术规格”的要求紧固螺钉

旋转装置总成的维护

对旋转总成进行维护时要求对其进行拆解，并且只能对从机箱里拆除的旋转总成进行维护。旋转总成从机箱拆除之后，要将固体端朝下放到支架上，以便拆卸液体转鼓头和传输装置。以下部分描述旋转总成的维护方法。

拆卸和解体

1. 对离心机停车、闭锁电源并挂牌上锁。



警示！ 打开顶盖或拆除防护板之前，必须让机器惯性滑行直至完全停止转动。

2. 当转鼓总成惯性滑行直至完全停止转动之后，松开固定机箱盖的螺钉直到螺钉从机箱下部脱出，然后将盖子抬起。
3. 拆下进料管和传动皮带。
4. 拆下齿轮箱外壳上的顶盖。

拆卸和解体（续）

5. 按以下方式拆卸齿轮箱：

   a. 拆下固定齿轮箱（见图 5-4）与法兰的六粒螺钉。

   b. 将两个 3/8”-16 顶丝插入齿轮箱法兰间隙孔里，交替拧动两个顶丝将齿轮箱与法兰分离。

   c. 进行剩余拆卸工作需要使用吊索和合适的提升装置对齿轮箱进行支撑。

   d. 交替转动顶丝将齿轮箱完全与法兰分离，直到装置彻底脱出。

   e. 用提升吊索和过顶提升装置支撑住齿轮箱，**小心地**将齿轮箱向外滑出花键轴。将齿轮箱放入塑料袋以防受到污染。

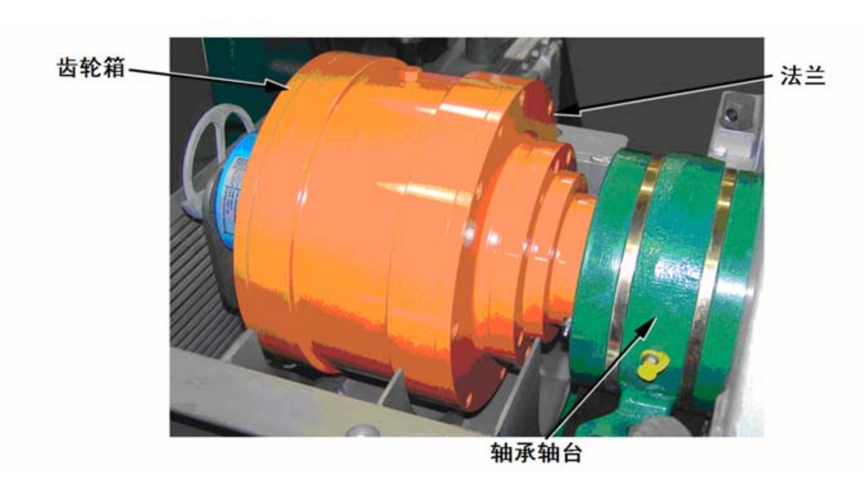


图 5-4：拆除齿轮箱

6. 将螺母紧到轴台对正销上将其顶出，然后拆下对正销。

7. 拆除固定轴台与底座安装垫的螺栓。

8. 将提升吊索连到旋转总成的两个位置，然后用至少能够提升 2000 磅的提升装置将旋转总成从机箱吊出并分离。

9. 记好轴台与底座安装垫之间所找到的所有垫片的位置，拆除垫片并妥善保管。

10. 在轴台和底座的配合面涂敷保护层。

11. 按以下方式拆除液体转鼓头总成：

    a. 垂直吊起旋转总成，固体端朝下，然后插入垂直支架的槽里（见图 5-5），同时继续用葫芦支撑它的重量。

    b. 记下液体转鼓头的对正标记位置，以确保重新装配时能够正确定位。

    c. 拆除固定液体转鼓头与转鼓总成的 12 粒螺钉（见图 5-6）。

    d. 将四个顶丝拧入转鼓头四个带螺纹的顶丝孔，均匀用力紧固直到转鼓头与转鼓分离。

e. 用第二个提升葫芦连接液体转鼓头的法兰，将转鼓头从连有轴台和花键轴的旋转总成中吊出。如果转鼓头没有完全从转鼓中分离，应将转鼓头放低直到留出刚好能够插入撬棍的空间。小心并均匀用力撬动转鼓头直到它与转鼓分离。提起并分开转鼓头。拆除转鼓头中的 O 形环并废弃不用。



图 5-5：将旋转总成固体端放到垂直支架上

12. 按以下方式拆卸传输装置总成：

   a. 拆下固定液体端密封座与传输装置的四粒螺钉，用顶丝将密封座与轴承箱分开，拆下密封座，密封件废弃不用。

   b. 将垂直提升托架定位到传输装置上（见图 5-7），然后紧固四粒螺钉。

   c. 将提升能力至少为 750 磅的提升葫芦连接到垂直提升托架上。

   d. 缓慢将传输装置从转鼓总成中吊出，操作时要小心不能让传输装置碰到转鼓内部。

   e. 水平定位传输装置，然后将其放到不碰瓦的支架上。

拆卸和解体（续）

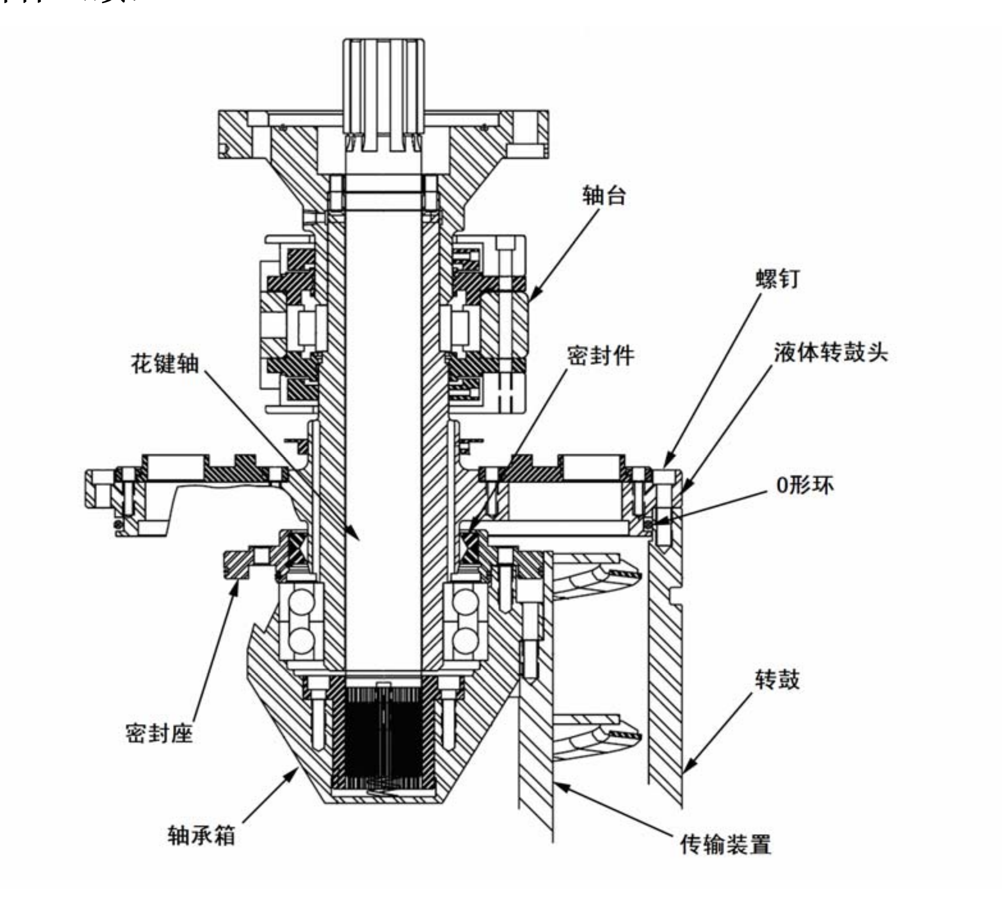


图 **5-6**：液体转鼓头的拆卸



图 **5-7**：将垂直提升托架与传输装置连接

清理、检查和修理

拆除并解体旋转总成之后，按以下方式对其进行清理、检查和修理：

1. 将传输装置和转鼓总成外部的泥浆和碎屑冲洗干净。
2. 检查传输装置是否出现缺瓦、变形或刮板擦伤、毛刺或者明显损伤。如果发现严重损坏，及时更换传输装置。
3. 检查传输装置进料喷嘴是否有明显磨损。如果磨损明显并不严重，可将其旋转 180 度然后重新安装。如果喷嘴严重受损，必须及时更换。为保持动态平衡，必须同时更换位置相对的一组喷嘴。
4. 检查传输装置内部的进料加速器是否有擦伤、断裂或变形。要求更换时，需拆除固定进料加速器的三粒定位螺钉并从固体端轻轻敲击使加速器退出。
5. 检查转鼓总成上的固料排放耐磨插件是否有裂缝、断裂或其它损坏。如果损坏严重，要及时更换。
6. 检查转鼓内部和外部是否有擦伤、划伤或其它可能影响性能的损伤。
7. 检查轴台轴承和传输装置轴承是否松动、异常响动或摩擦。请根据本章“轴承的更换”的内容更换任何有缺陷的轴承。

重新装配与安装

旋转总成的重新装配与安装步骤基本上是将拆卸步骤倒过来执行。请按以下方法重新装配和安装旋转装置总成：

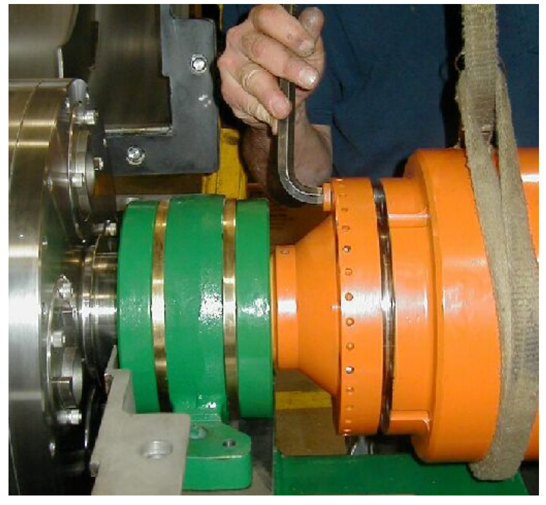
1. 按下以方式准备并将传输装置安装到转鼓总成中：
   a. 在传输装置的轴承座和密封表面上涂上薄薄的一层油脂以便安装。
   b. 转鼓放在垂直支架上保持垂直位置，吊起转鼓上方的传输装置并小心将其放入转鼓。
   c. 拆除传输装置上的垂直提升托架。
   d. 将新的密封件安装到密封座上（图 5-6），在密封件上涂上薄薄的一层滑脂，然后将密封座装入轴承箱里。在螺钉上涂一层防粘剂，将螺钉穿过密封座并根据本章“扭矩紧固件的技术规格”的要求紧固到轴承箱内。
2. 将新的 O 形环安装到液体转鼓头的刻槽内，并在 O 形环上涂薄薄一层滑脂，然后将液体转鼓头装到转鼓上。根据相应的对正标记对转鼓头进行定位，然后用螺钉将液体转鼓头与转鼓固定起来。根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
3. 去除轴台和配合面上的所有缺口和/或毛刺。去除干净之后将涂敷的所有保护涂料清除干净。
4. 按照垫片拆除前所标注的位置重新将其正确安装好。
5. 重新安装之前，要先清理所有对正销，然后再涂敷一层防粘剂。
6. 将旋转总成定位到水平位置，然后小心将其放入机箱内直到高出底座大约 1/2”的地方。
7. 将螺栓穿过轴台并拧入底座。不要上紧螺栓。

重新装配与安装（续）

8. 将旋转总成完全降低落到底座上。
9. 将对正销穿过轴台插进并轻轻敲入孔内，以便将轴台和底座安装孔完全对正。
10. 根据本章“扭矩紧固件的技术规格”的要求紧固螺钉，将轴台与底座固定好。
11. 按以下方式安装齿轮箱：



11a. - 将新的 O 形环插入齿轮箱平面的凹槽内，然后在轴上涂一层油脂以便进行安装。将吊索套到齿轮箱上，然后使用过顶提升装置**小心**提升并定位齿轮箱，使花键轴与齿轮箱内部键槽啮合。



11b. - 将六粒新的六角头螺钉穿过齿轮箱法兰插入齿轮箱螺纹安装孔。交替拧动每个螺钉，以便均匀地将齿轮轮和法兰一道抽出。

使用圆头螺栓常用的星形工具上紧安装螺钉。所用扭矩请参见本章“扭矩紧固件的技术规格”的内容。

12. 将油脂注入传输装置的轴承内，直到轴台和液体转鼓头之间的排油孔冒出油为止。将多余的油脂擦净，先按顺时针方向然后按逆时针方向各旋转液体转鼓头一圈，让油脂得到良好的分配。

13. 按以下步骤检查并调整齿轮箱外径摆动度。轴向摆动度不得超过总读数（TIR）的 0.002"。请按以下方式测量并调整摆动度：

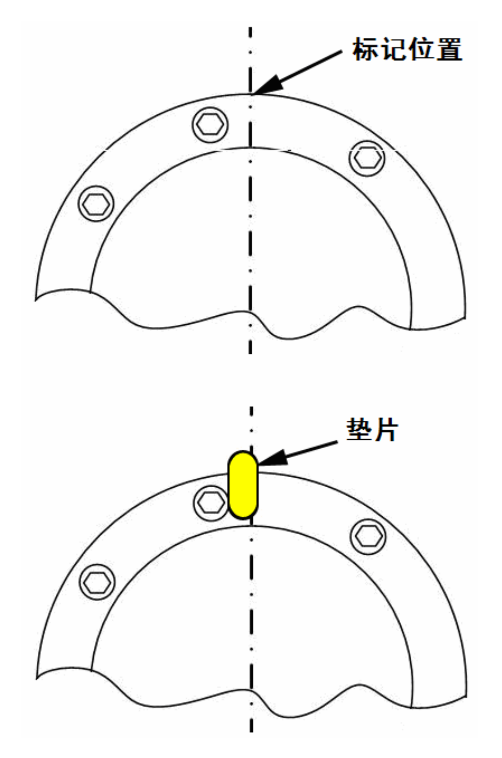


a. 将齿轮箱表面与刻度式指示器铁芯接触的地方清理干净。
b. 在所示任何一个位置安装带磁底座的指示器固定架。
c. 将刻度式指示器的铁芯定位为在齿轮箱水平中心线位置与外径接触。
d. 手动旋转齿轮箱直到刻度式指示器达到最低读数，然后将刻度式指示器清零。



e. 手动旋转齿轮箱直到刻度式指示器达到最高读数；在齿轮箱和法兰上沿轴向中心线在表面配合的位置拉一条标记线。

重新装配与安装（续）



f. 手动旋转齿轮箱，直到在第 e 步中所做标记达到顶部。

g. 松开距离此标记最近的六角头螺钉以及标记两侧的螺钉。

h. 在法兰与齿轮箱之间插入厚度与刻度指示器显示厚度差不多的垫片。垫片只能接触距离第 e 步所做标记最近的螺丝孔的螺纹。

i. 上紧在第 g 步中被松开的螺钉。

j. 如果需要，可重复第 d 到第 i 步骤，直到 TIR 不再超过 0.002”。

k. 对凸出来的垫片进行修整。

14. 齿轮箱安装完成之后，将顶盖安装到齿轮箱上。

15. 安装传动皮带并适当张紧，以防皮带打滑。

16. 安装进料管并将其与支架固定。

17. 关闭盖子并上紧螺钉。

主轴承的更换

该步骤描述了安装在轴台里的主轴承的更换方法。拆卸和安装所用工具可参见本章“工具与设备”部分的内容 。

离心机运行时如果出现异常噪音或振动，表明轴承可能出现缺陷。如果这种情况明显，应当检查轴承是否松动。如有必要，可进行更换。

轴承必须由经过适当培训并且胜任工作的人员更换。为避免对新轴承和离心机内部构件造成污染，必须在干净的环境下进行更换。

旋转总成的端部用装配在轴台内的滚柱轴承支撑。轴台两侧的部件构成了迷宫式润滑脂腔，可以防止污染物进入。滚柱轴承具有单独的内圈，在拆下轴承之后必须将其从转鼓头的轴上拆下来。

轴台上的轴承必须整体成套更换。也就是说，如果发现一个轴承出现缺陷，必须同时更换两个轴承。

主轴承的拆卸

先拆哪个轴承都可以。以下部分先介绍液体端轴台轴承的拆卸，然后再介绍固体端轴承的拆卸。无论发现哪个轴承出现缺陷，都要同时将两个轴承做为一个整体一同更换。

液体端轴承

按以下方法拆卸液体端主轴承：



警示！为避免人员受重伤，维护和/或调整工作开始之前，一定要确认设备被闭锁、挂牌上锁、去激励并且已经停止转动。

1. 对离心机停车、闭锁并挂牌上锁。让旋转总成惯性滑行直至完全停止转动。
2. 打开机盖，拆除连接液体端和固体端轴台与机箱的螺钉。
3. 使用合适的葫芦将旋转总成提高，将轴台与机箱底部分开，以便留出足够的空间方便拆除轴台。
4. 按以下方式拆下液体转鼓头上的齿轮箱（图 5-9）：
   a. 在齿轮箱和法兰上拉一条线，保证安装时能够正确定位。使用 14mm 六角扳手拆除齿轮箱与法兰之间的六颗固定螺钉。
   b. 为确保对垫片正确定位，要在法兰和齿轮箱之间做垫片加垫位置的标记。将两个 3/8”-16 顶丝插入彼此间隔 180°的法兰间隙孔里。开始将齿轮箱从法兰处分离时，要使用一个 9/16”套筒扳手分别交替拧动两个顶丝。
   c. 进行剩余拆卸工作需要对装置进行支撑时，可将提升吊绳绕在齿轮箱上，然后将吊绳与过顶提升装置连接。交替转动顶丝将装置完全与法兰分离，直到装置彻底脱出。
   d. 用提升吊索和过顶提升装置支撑住齿轮箱，**小心地**将装置向外滑出花键轴。将齿轮箱放入塑料袋以防受到污染。

液体端的轴承（续）



第 4a 步：齿轮箱连接螺钉



第 4b 步：使用顶丝将齿轮箱与法兰分离



第 4c 步：拆卸时使用吊索支撑齿轮箱

图 5-9：齿轮箱的拆卸

12. 转动法兰（见图 5-10）直到法兰上大的穿露孔与外侧抛油环盖的挡圈螺钉对正为止。拆除固定外侧抛油环盖与轴台的螺钉，然后抬高并拆除抛油环盖子。
13. 拆除法兰与液体转鼓头之间的固定螺钉，松开法兰与液体转鼓头之间的定位螺钉。.

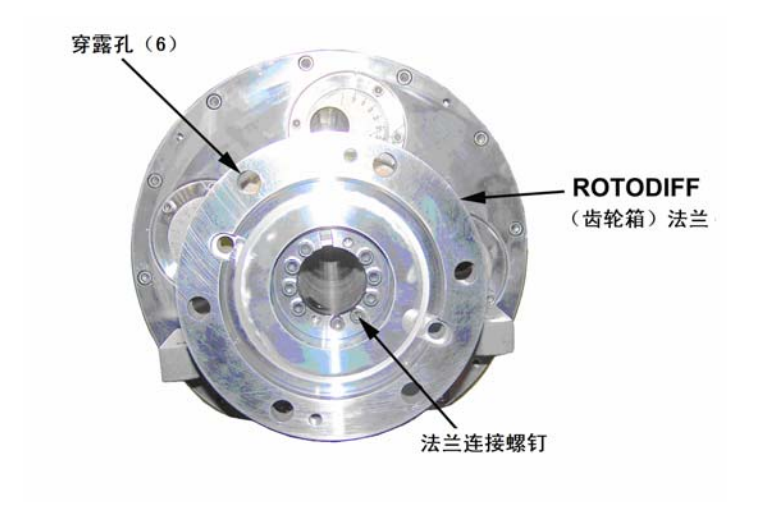


图 5-10：齿轮箱的法兰连接

14. 将两个顶丝拧入法兰，分别交替拧每个螺旋几转，直到法兰从液体转鼓头分离为止；然后抓住法兰，将其从液体转鼓头中抽出来。



注意！外侧抛油环将保持与法兰连接。

15. 拆除固定外侧轴台盖（见图 5-11）与轴台的平头螺钉并拆下盖子。从轴台盖取下 O 形环并丢弃。
16. 拆除固定内侧轴台盖与轴台的平头螺钉，将轴台（见图 5-12）、轴承外圈和轴辊滑出液体转鼓头。
17. 松开固定内侧抛油环与液体转鼓头的定位螺钉。
18. 使用合适的拆卸工具将轴承内圈从转鼓头处分离，操作时要格外小心以免损坏轴承座或液体转鼓头的肩部。内圈应废弃不用。
19. 将内侧轴台盖和抛油环滑出转鼓头。从轴台盖取下 O 形环并丢弃不用。
20. 使用合适的拆卸工具从轴台拆下轴承外圈和轴辊。外圈和轴辊应废弃不用。

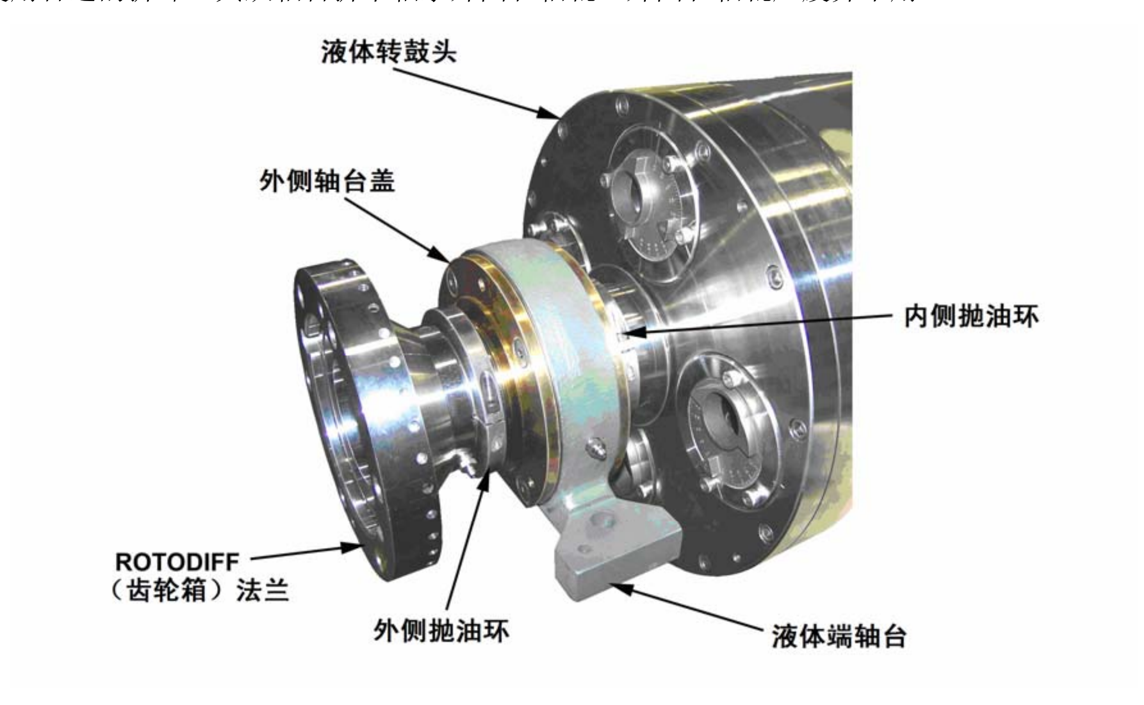


图 5-11：液体端轴台及轴承部件的方位

液体端的轴承（续）

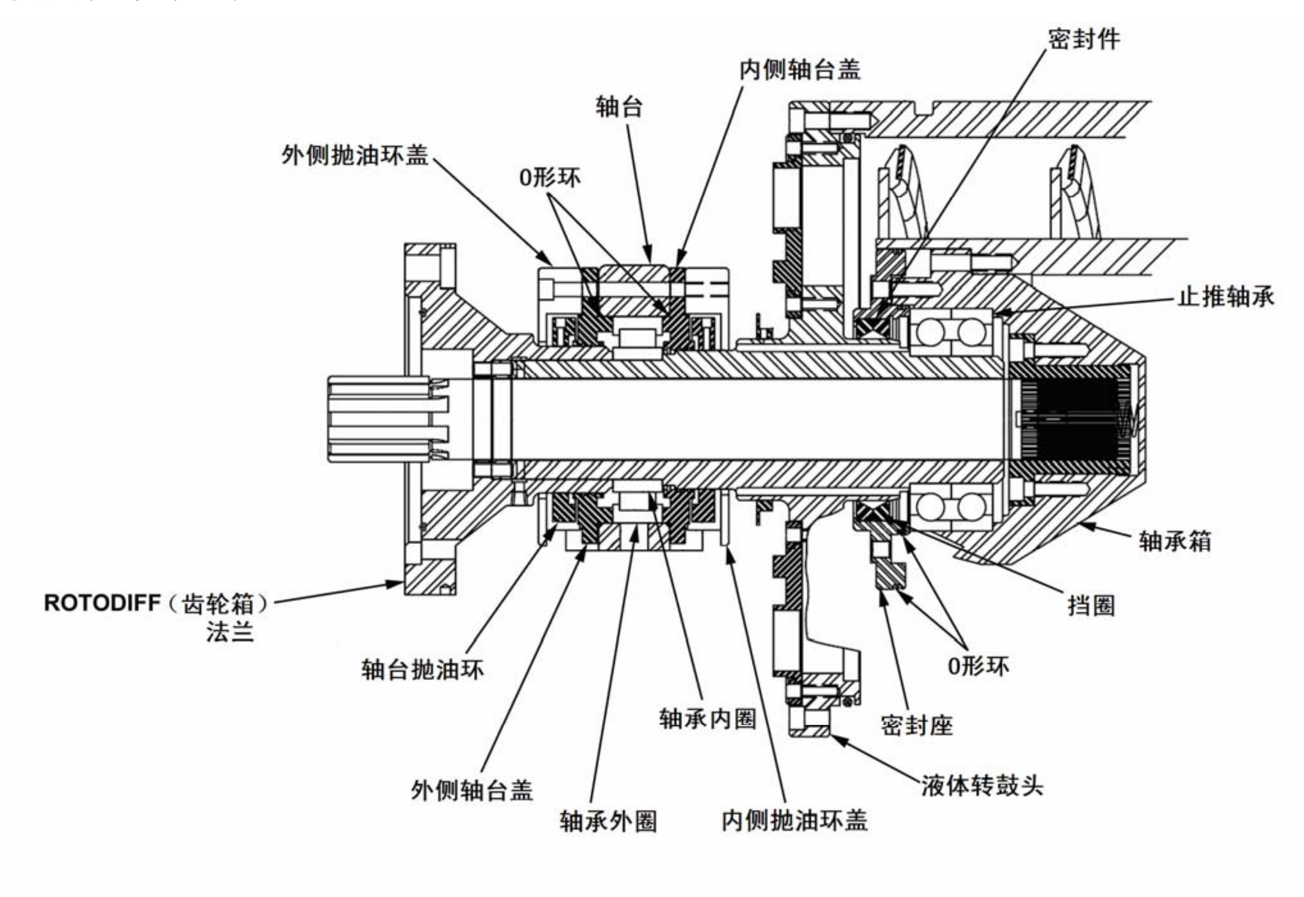


图 **5-12**：液体端的横截面

固体端轴承

当液体端轴台轴承已经拆除并且旋转总成仍然悬垂时，按以下方法拆除固体端轴承（见图 5-13）：

1. 拆下内侧和外侧抛油环盖与轴台之间的固定螺钉，将内侧抛油环盖抬高并拆下。
2. 记下皮带轮上的对正标记，然后拆除皮带轮与固体转鼓头之间的固定螺钉。
3. 将两个顶丝拧入皮带轮，分别交替拧每个螺旋几转，直到皮带轮从固体转鼓头分离为止；拆除皮带轮和外侧抛油环盖。
4. 抓住皮带轮，将其从液体转鼓头处抽出。



注意！外侧抛油环将保持与皮带轮连接。

5. 拆除固定外侧轴台盖与轴台的平头螺钉并拆下盖子。从轴台盖取下 O 形环并丢弃。

6. 拆除固定内侧轴台盖与轴台的平头螺钉，将轴台、轴承外圈和轴辊滑出固体转鼓头。
7. 松开固定内侧抛油环与固体转鼓头的定位螺钉。
8. 使用合适的拆卸工具将轴承内圈从转鼓头处分离，操作时要格外小心以免损坏轴承座或固体转鼓头的肩部。内圈应废弃不用。
9. 将内侧轴台盖和抛油环滑出转鼓头。从轴台盖取下 O 形环并丢弃不用。
10. 使用合适的拆卸工具从轴台拆下轴承外圈和轴辊。外圈和轴辊应废弃不用。

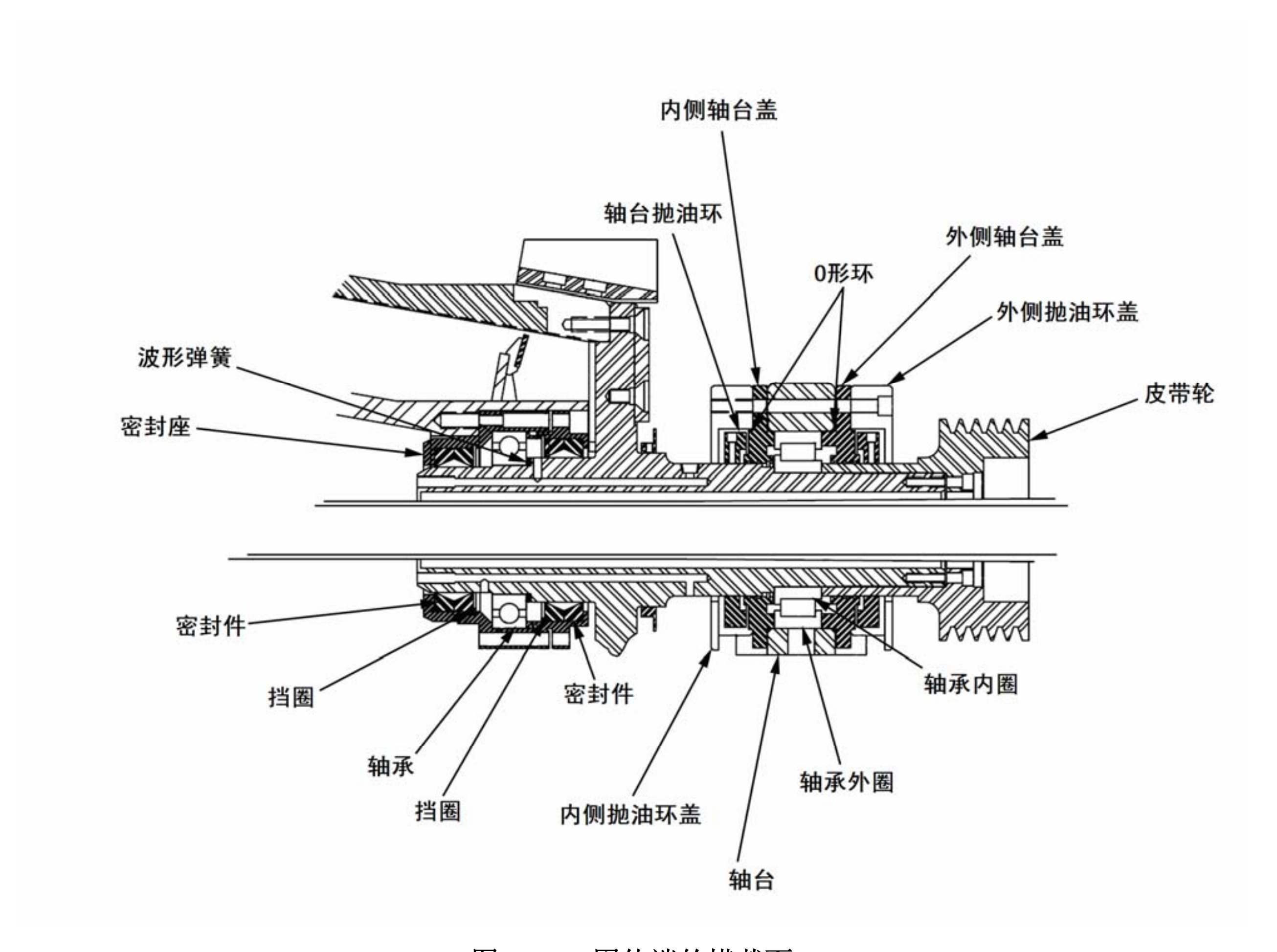


图 **5-13**：固体端的横截面

清理、检查和修理

1. 使用适当的清洁剂/去油剂对所有部件进行清理，然后用经过过滤的压缩空气吹干。去除所有锈渍，方便进行检查。
2. 检查转鼓头的轴是否有影响它重返操作适配性的划伤、缺口、毛刺或变形。对任何微小的表面缺陷可做现场处理。如果轴出现明显变形或严重裂痕使转鼓头不能继续工作，要对转鼓头进行更换。
3. 检查新的轴承内圈是否与两个转鼓头的主轴颈配合良好。如果轴颈太小，外圈很容易会滑到轴颈上。如果发现轴颈尺寸过小，要及时更换转鼓头。
4. 检查轴台盖、抛油环和抛油环盖是否有腐蚀、变形、缺口、裂缝、毛刺、断裂或其它缺陷。对任何微小的缺陷进行修复。
5. 更换所有不易修理的部件。更换 O 形环、密封件和轴承。
6. 将所有清洁的部件放入干净的塑料袋，避免受到污染。

安装

以下部分先是对液体端主轴承后是对固体端主轴承的安装方法进行了描述。但是，先在哪个转鼓头上安装对应的轴承都可以。

液体端轴承



警示！在以下操作中，请使用轴承加热器或清洁热油浴器对轴承内圈进行加热。不能使用喷灯直接加热，否则会使轴承受损。

1. 将液压端轴承的轴承内圈放入轴承加热器或清洁的高温油浴器中，将其加热到大约 230°F（见图 5-14）。不能使用喷灯直接对轴承内圈进行加热，以免损坏。
2. 佩戴好隔热手套将加高温内圈从轴承加热器中取出，然后立即套上轴颈，将其滑到抵住转鼓头肩部的位置为止。让内圈冷却下来并卡住固体转鼓头不再移动时为止。
3. 将内侧轴台抛油环滑到轴上，然后装上轴台盖子。此刻不要紧固抛油环的定位螺钉。
4. 将轴承外圈和轴承辊装入轴台倒角内。使用合适的只接触到轴承外圈的工具，小心将外圈轻敲进轴台内到达轴台表面以下大约 1/8 英寸的地方。
5. 将新的 O 形环装到内侧轴台盖的肩部上，然后将轴台盖滑装到轴上。
6. 用足量的用户技术规格要求的轴承润滑脂将轴承辊完全盖满。
7. 将装配好的轴台和轴承外圈套到先前安装在轴颈上的内圈上。
8. 将新的 O 形环装到外侧轴台盖的肩部上，将轴台盖套到轴上抵住轴台。

9. 对内侧轴台盖定位，使其平的一面正对轴台底。
10. 在四个平头螺钉上涂上防粘剂，然后安装这些螺钉将内侧轴台盖与轴台固定起来。根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
11. 对外侧轴台盖定位，使其平的一面正对轴台底。
12. 在四个平头螺钉上涂上防粘剂，然后安装这些螺钉将外侧轴台盖与轴台固定起来，并将轴承拉到轴台内正确的位置上。根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
13. 将外侧轴承抛油环套到 Rotodiff 法兰上，让螺钉松着。
14. 在转鼓表面安装 Rotodiff/齿轮箱法兰的地方薄薄地涂上一层滑脂。
15. 戴好隔热手套，用销键将法兰的凹槽对着液体转鼓头的轴并将法兰安装到轴上。用定位螺钉将法兰固定好。
16. 将内侧和外侧轴台抛油环滑到靠近轴台盖的位置，只留大约 1/16 英寸的间隙，然后上紧两个抛油环的定位螺钉。
17. 安装抛油环盖并拧紧螺钉。
18. 使用提升吊索和过顶提升装置，用拆卸对位时的划线对齿轮箱进行定位，然后将齿轮箱滑到花键轴上。将螺钉穿过法兰插入 Rotodiff，将垫片插入拆卸时标注的位置，然后上紧螺钉。

固体端轴承



警示！在以下操作中，请使用轴承加热器或清洁热油浴器对轴承内圈进行加热。不能使用喷灯直接加热，否则会使轴承受损。

1. 将轴承内圈放入轴承加热器或清洁的高温油浴器中，将其加热到大约 230°F（见图 5-14）。不能使用喷灯直接对轴承内圈进行加热，以免损坏。
2. 佩戴好隔热手套将加高温内圈从轴承加热器中取出，然后立即套上轴颈，将其滑到抵住转鼓头肩部的位置为止。让内圈冷却下来并卡住固体转鼓头不再移动时为止。
3. 将内侧轴台抛油环滑到轴上，然后装上轴台盖子。此刻不要紧固抛油环的定位螺钉。
4. 将轴承外圈和轴承辊装入轴台倒角内。使用合适的只接触到轴承外圈的工具，小心将外圈轻敲进轴台内到达轴台表面以下大约 1/8”的地方。
5. 将新的小横面的 O 形环装到内侧轴台盖的肩部上，然后将轴台盖滑装到轴上。
6. 用足量的用户技术规格要求的轴承润滑脂将轴承辊完全盖满。

液体端轴承（续）

7. 将装配好的轴台和轴承外圈套到先前安装在轴颈上的内圈上。
8. 将新的大横面的 O 形环装到外侧轴台盖的肩部上，将轴台盖套到轴上抵住轴台。
9. 对内侧轴台盖定位，使其平的一面正对轴台底。





将轴承轻轻敲入轴台

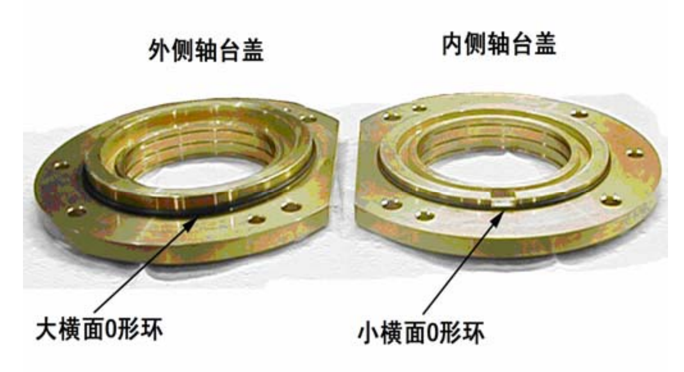




图 5-14：主轴承安装详图

10. 在四个平头螺钉上涂上防粘剂，然后安装这些螺钉将内侧轴台盖与轴台固定起来。根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
11. 对外侧轴台盖定位，使其平的一面正对轴台底。
12. 在四个平头螺钉上涂上防粘剂，然后安装这些螺钉将外侧轴台盖与轴台固定起来，并将轴承拉到轴台内正确的位置上。根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
13. 将外侧轴承抛油环套到皮带轮上，让螺钉松着。
14. 在转鼓表面安装皮带轮的地方薄薄地涂上一层滑脂。
15. 将皮带轮加热到 200°F。戴好隔热手套，用销键将皮带轮的凹槽对着固体转鼓头的轴并将皮带轮安装到轴上。用螺钉将皮带轮固定好。

16. 将内侧和外侧轴台抛油环滑到靠近轴台盖的位置，只留大约 1/16 英寸的间隙，然后上紧两个抛油环的定位螺钉。
17. 安装抛油环盖并拧紧螺钉。
18. 用葫芦将旋转总成落到离心机内直到轴台接触到底座。
19. 将对正销插入轴台对正孔并插入螺栓。拆下对正销，根据本章“扭矩紧固件的技术规格”的要求紧固轴台螺钉。

传输装置轴承的更换

此步骤要求将传输装置总成从转鼓总成分离。传输装置轴承更换时必须选择干净的环境并由经过培训并且胜任的人员完成。

如果发现传输装置的轴承出现缺陷，传输装置很有可能需求彻底进行大修。因此，必须对所有部件仔细进行检查，并且对所有配合密接和间隙进行测定，以确定部件是否适合再次使用。

拆卸

液体端包括两个止推轴承，传输装置固体端装有一个单滚珠轴承。如果发现振动过度、轴端间隙或径向松动等现象，需要将全部传输装置轴承整套进行更换。以下步骤描述液体端轴承和固体端轴承的拆卸方法。请按以下所述拆下传输装置的轴承：

1. 根据本章“预防性维护”的内容从旋转总成拆下传输装置。
2. 将传输装置支撑好，拆下固定提升托架与传输装置的螺钉并拆除提升托架。
3. 按以下方式拆下液体端止推轴承：
   a. 拆下连接轴承箱的液体端密封座上的螺钉（见图 5-12）并拆下密封座。拆除并丢弃密封座外部刻槽中的 O 形环。
   b. 使用合适的锤形拆卸工具，将液体端轴承箱中的两个止推轴承用力抽出并丢弃。
   c. 拆下密封座中连接密封件的挡圈，拆除密封件并丢弃。
4. 按以下方式拆下固体端轴承：
   a. 拆下连接传输装置的密封座和轴承箱上的螺钉（见图 5-13），拆下密封座和轴承箱。将密封座与轴承箱分开。
   b. 拆下密封座里固定密封件的挡圈。拆除并丢弃密封座里的密封件和 O 形环。
   c. 从轴承箱中用力抽出轴承并丢弃。
   d. 拆下轴承箱中固定密封件的挡圈，将密封件拆除并丢弃。
   e. 拆下固体转鼓头轴上的波形弹簧。

清理、检查及修理

1. 使用适当的清洁剂/去油剂对所有部件进行清理，然后用经过过滤的压缩空气吹干。去除所有锈渍，方便进行检查。
2. 检查转鼓头的轴是否有影响它重返操作适配性的划伤、缺口、毛刺或变形。对任何微小的表面缺陷可做现场处理。如果轴出现明显变形或严重裂痕使转鼓头不能继续工作，要对转鼓头进行更换。
3. 检查轴承和密封座是否有腐蚀、变形、缺口、裂缝、毛刺、断裂或其它缺陷。对任何微小的缺陷进行修复。
4. 检查固体转鼓头的波形弹簧是否保持其张紧度。如果弹簧受损张紧度不足，要及时更换。
5. 更换发现已经受损且不易修复的部件。更换所有密封件、O 形环和轴承。
6. 检查新的轴承内圈是否与两个转鼓头的轴承座箱配合良好。如果膛孔太小，外圈很容易会滑入膛孔。如果发现膛孔太松，及时更换轴承箱。
7. 将所有清洁的部件放入干净的塑料袋，避免受到污染。

安装

轴承安装按照与拆卸相反的步骤进行。部件必须清洁，必须在干净的环境下进行安装，避免对新的轴承造成污染。确保所有传输装置的轴承都必须整套更换。首先安装液体端的止推轴承，然后安装固体端的轴承。

1. 按以下方式安装液体端的传输装置轴承：
   a. 将新的密封件插入液体端的密封座（见图 5-12），与挡圈牢固连接，在密封座外部刻槽上安装新的 O 形环。
   b. 将新的止推轴承放到轴承箱膛孔上，使用合适的工具均匀用力将轴承轻敲到位抵住轴承箱的肩部。然后对第二个止推轴承进行定位，部件号朝上以便识别，将其装入轴承箱内前一个轴承的顶部。
   c. 将新的 O 形环装到密封座的外部刻槽上。
   d. 将密封座定位于轴承箱上并上紧螺钉。请根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
2. 按以下方式安装固体端传输装置的轴承：
   a. 将新的密封件插入密封座（见图 5-13），然后与挡圈固定。
   b. 将新的 O 形环装入密封座的外槽内。
   c. 将新的密封件插入轴承箱内，然后与挡圈固定。
   d. 将新的轴承插入轴承箱，使其完全抵住肩部。
   e. 将轴承箱插入传输装置的开口，将密封件装到轴承箱的上面，然后用螺钉将外壳与传输装置固定好。请根据本章“扭矩紧固件的技术规格”的要求紧固螺钉。
3. 将传输装置重新安装到转鼓总成中，然后根据本章“预防性维护”的内容将转鼓总成安装到离心机上。

转鼓速度的调整

改变电机的皮带轮可以改变转鼓速度。第 4 章列出的目前使用的皮带轮的情况。选择好需要的皮带轮之后，请按以下步骤更换皮带轮。



警示！该操作只能由经过培训并且胜任的人员进行。不合格人员不得进行此操作。

1. 对离心机停车、闭锁电源并挂牌上锁。
2. 松开固定进料管夹的螺钉，滑出进料管。
3. 松开锁闩，拆除保护电机皮带轮和液力偶合器的皮带防护板。
4. 松开固定电机底脚与安装底座的四粒防松螺母（见图 5-15）。
5. 逆时针方向均匀地转动调整螺栓，直到电机向内充分地移动，能够释放皮带的张紧度。
6. 将传动皮带滑出电机皮带轮。
7. 拆下固定电机皮带轮与固体转鼓头的螺钉并拆下皮带轮。
8. 在固体转鼓头上安装新的电机皮带轮，并用六角头螺钉固定。根据本章扭矩紧固件的技术规格的要求紧固螺钉。
9. 将皮带重新安装到电机皮带轮上。
10. 上紧电机安装可调节螺栓对皮带作用充分的张紧力，以便按压皮带的中心点时皮带能够达到 5/8”的挠度。正确的张紧度可以防止皮带没有过载轴承时不会打滑。设定好正确的张紧度之后，用直尺横量转鼓和电机皮带轮检查皮带轮的平行对正情况。皮带轮的对正误差必须在 0.0156 之内。如果皮带轮未正确对正，可按要求紧固或松开一粒调整螺钉。完成皮带轮的对正工作以后，将电机的所有四粒防松螺母紧固到位。
11. 将皮带防护板重新安装好，将锁闩锁好，确保防护板固定到位。
12. 将进料管插入进料管支架直到其肩部完全接触支架并按本章扭矩紧固件规格的要求紧固螺钉。



图 5-15：传动皮带张紧度的调整

过载安全离合器的调整



警示！该操作只能由经过培训并且胜任的人员进行。不合格人员不得进行此操作。

如果频率出现过载脱扣并且无法通过调整进料速率和/或液池深度予以解决，问题可能出自过载安全保护总成的扭矩设定值不正确。应当检查并冰炭不同器安全保护总成的扭矩设定值。如果需要，可按以下方式进行：

1. 拆除齿轮箱驱动装置的盖子。
2. 拆下过载安全离合器的扭矩凸轮。
3. 将扭矩扳手的套筒键 13147-00（在工具包 14795-00 中）插入过载安全离合器的键槽内。按顺时针方向（面对离合器时）对扭矩扳手作用足够的力，将离合器解开。传动比为 52:1 的齿轮箱解开离合器所需扭矩力为 335 英寸・磅，125:1 齿轮箱解开离合器的扭矩力则为 200 英寸・磅。
4. 按以下方式对离合器进行复位：
   a. 转动离合器毂，直到凸轮辊销的孔和毂的键槽与定位螺钉的孔对正（过载离合器的外壳上有 022 的印记）。
   b. 顺时针方向（向内）转动 T 形手柄复位螺钉（见图 5-16）大约 2-1/2 转，直到听到咔嗒一声响，表示离合器复位了。



注意！顺时针方向转动复位螺钉时，感觉到轻微的阻力后转动不得超过三转，因为过度紧固会损坏离合器内部元件。

   c. 通过旋转凸轮/毂总成来检查离合器是否复位。如果可以旋转，请重复以上 a 和 b 步骤。



注意！进行以下操作时，在离心机返回运行之前必须将 T 形手柄复位螺钉完全拧下到它的初始位置。

   d. 确定离合器已经复位后，逆时针旋转（向外）将 T 形手柄定位螺钉拧到它初始的位置。
   e. 使过扭矩限制开关辊重新与扭矩臂接触。

5. 如果要求的扭矩小于第 3 步规定的扭矩值，可顺时针旋转调整螺钉（见图 5-17）增大扭矩，直到与离合器外壳上面下一个铣槽深度平齐并且与划线对齐为止；然后再次检查扭矩。传动比为 52:1 的齿轮箱的扭矩设定不得超过 335 英寸・磅，125:1 齿轮箱的扭矩设定不得超过 200 英寸・磅。.

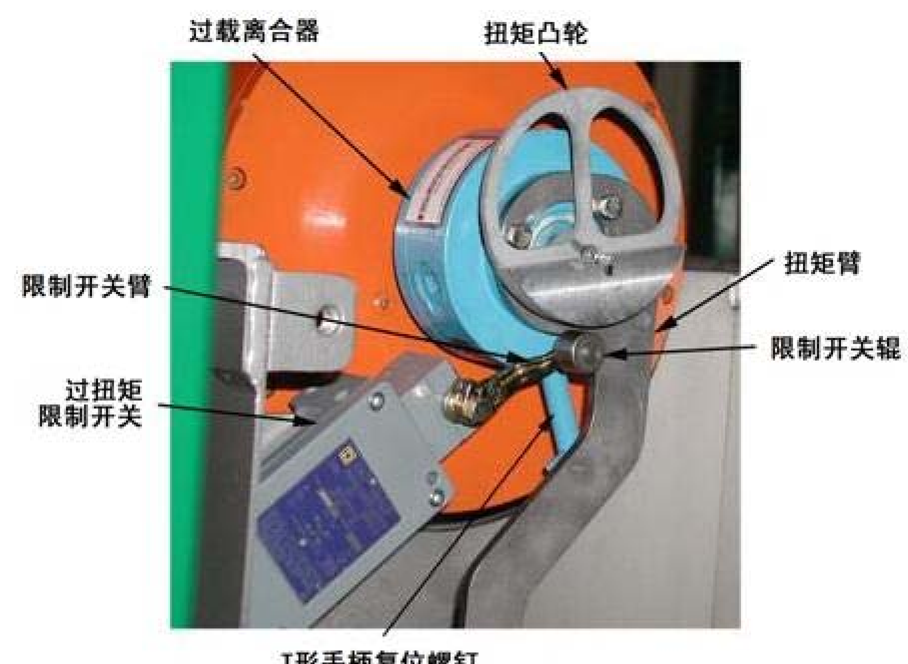


图 **5-16**：过载安全离合器的构件



警示！扭矩设定值过大会造成离心机受损。**52**：**1** 的齿轮箱不要将离合器设定为在高于 **335** 英寸磅的情况下解开，**125**：**1** 的齿轮箱则不能设定为高于 **200** 英寸磅。

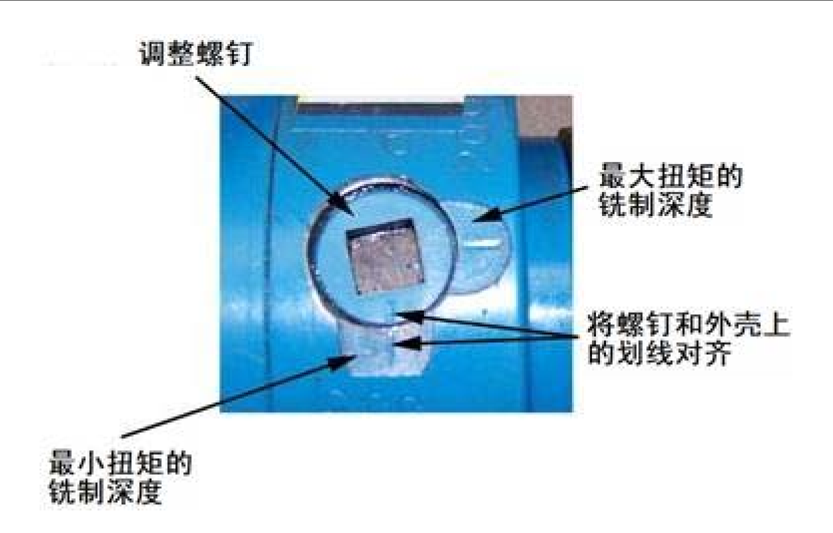


图 **5-17**：过载安全扭矩的设定

工具清单

下列工具清单包括所提供的方便进行 DE-1000 GBD 离心机维护的所有工具和设备。每个工具组件都列有部件号、所提供的数量及其用途。

DE-1000 GBD 离心机工具清单		
部件号	**描述 / *应用***	**数量**
Allen 33212	长臂六方孔螺钉头用扳手, 3/32” — 1/2” *各种旋转总成件*	1
Allen 41216	六角头套筒, 1/2” x 1/2” 驱动 *各种旋转总成件*	1
Allen 14MM	六方孔螺钉头用扳手, 14 MM *各种旋转总成件*	1
OTC-1039	轴承拆卸工具, 2 钳口, 可达到 10”, 伸展 0”—12” *从液体转鼓头轴上拆下主轴承内圈*	1
HXCBF038-16X250	六角头定位螺栓, 3/8-16 x 2-1/2” 长 *从法兰处分离齿轮箱*	2
HXCBF031-18X400	六角头定位螺栓, 5/16-18 x 4” 长 *从液体端转鼓头轴上分离传输装置的轴承箱*	4
HXCBF038-16X400	六角头定位螺栓，3/8-16 x 4” 长 *从固体端转鼓头轴上分离传输装置的轴承箱*	4
10792-00	垂直提升托架 *从液体转鼓总成中提出传输装置*	1
10791-00	垂直支架 *进行维护工作时垂直支撑液体转鼓总成。*	1
WFSS-31	5/16” 平垫片 *连接垂直提升托架与齿轮箱法兰。*	6
NHHS-31-18	六角螺母， 重型， 5/16-18 *连接垂直提升托架与齿轮箱法兰。*	6
SKCS-38-16x175	内六角螺钉, 3/8-16 x 1-3/4” *连接垂直提升托架与齿轮箱法兰。*	4
RED-B150X125	六角套筒, 1-1/4” x 1-1/2” *缩小进料管开口*	1

DE-1000 GBD 离心机工具清单		
部件号	描述 / *应用*	数量
CHE-SRI-2	滑脂, 标准型* *对主轴承和齿轮箱键槽进行润滑。*	1
Aeroshell GR-14	滑脂, Arctic（冷冻机油）* *对主轴承和齿轮箱键槽进行润滑。*	1
EYE-S31-18X113	眼螺栓, 3/8” x 1-1/8” *将旋转总成从齿轮箱法兰上提起*	2
PP1127	油枪, 直径 1/2” 加油软管, 14.5 盎司 *将油脂注入齿轮箱和主轴承接头*	2

扭矩紧固件的技术规格

只能使用 Derrick 公司认可的扭矩紧固件。使用劣等的未经 Derrick 公司认可的扭矩紧固件可能造成人员受重伤和/或设备受损。另外，如果使用未经认可的扭矩紧固件，将使包括书面或暗示的对设备的有效保证作废。关于扭矩紧固件类型的选用和 Derrick 离心机使用方面的问题，请与 Derrick 公司联系。.



警示！使用劣等的未经 Derrick 公司认可的扭矩紧固件可能造成人员受重伤和/或设备受损。

图 5-18 和 5-19 示出了离心机上所用各种类型和尺寸的紧固件的锁紧扭矩技术规格、润滑剂情况和其它紧固件安装技术要求等。

按以下方式上紧紧固件：

1. 只能使用经过校验的扭矩扳手。
2. 安装之前，将规定的润滑剂涂到紧固件上。
3. 如果需要紧固的螺栓超过一颗，要交替对每颗螺栓进行紧固。
4. 必须分多次达到最终扭矩的紧固。

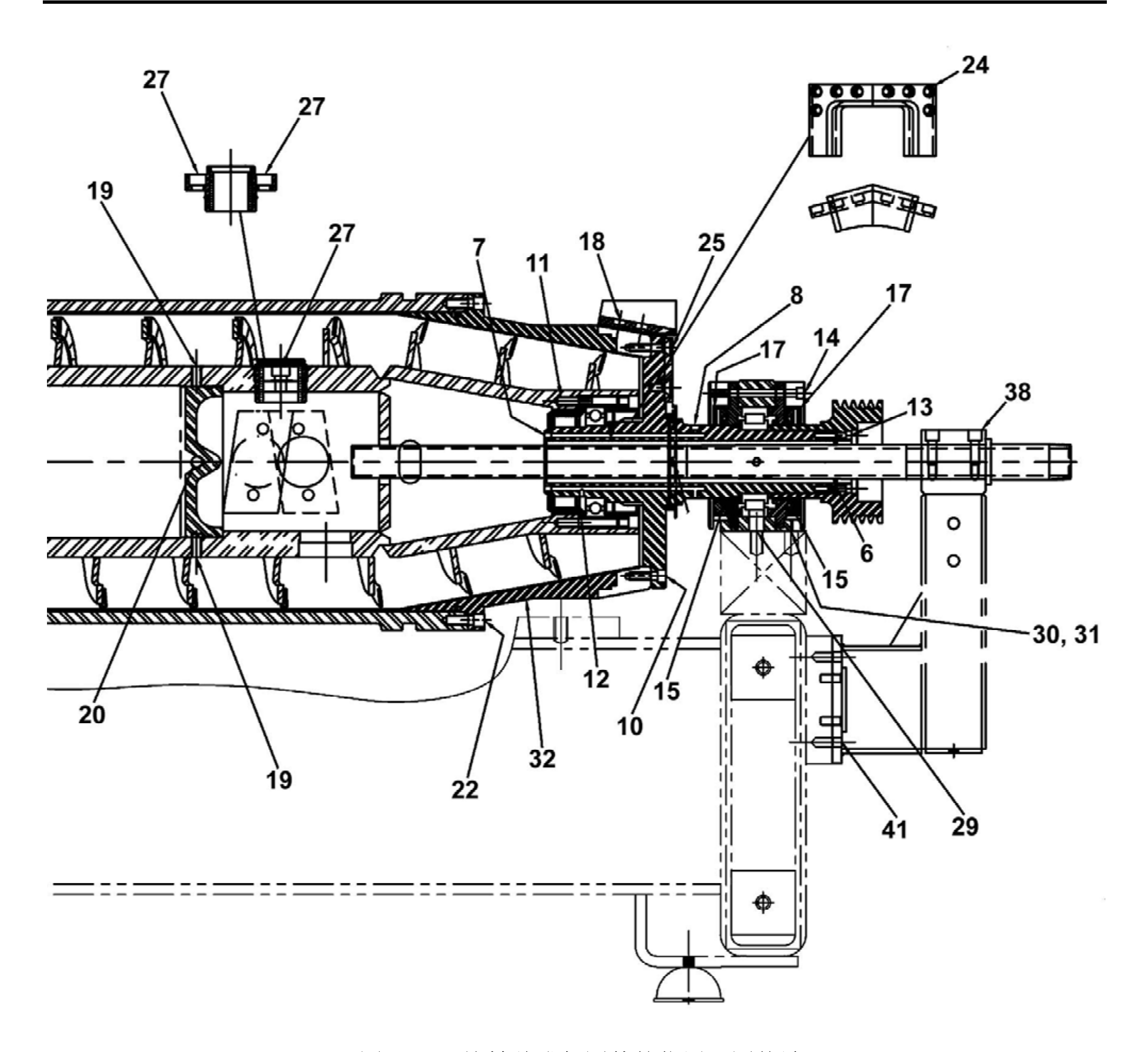


图 **5-18**：旋转总成紧固件的位置—固体端

固体端扭矩紧固件的技术规格					
编号	描述	数量	润滑剂	扭矩	位置
6	1/4 x 1-1/4 钉销	4	乐泰 680	不适用	固体端转鼓头
7	5/16-18 x 1/2 定位螺钉	2	乐泰 262	不适用	固体端转鼓头
8	1/8 NPT x 3/4 滑脂接头	2	不适用	不适用	固体端转鼓头
10	3/8-16 x 1 内六角螺钉	8	防粘润滑剂	252 英寸 • 磅	固体端转鼓头
11	5/16-18 x 3 内六角螺钉	6	防粘润滑剂	144 英寸 • 磅	固体端密封座
12	1/4 x 1 钉销	1	乐泰 680	不适用	固体端轴承箱
13	1-4-20 x 1 内六角螺钉	8	防粘润滑剂	83 英寸 • 磅	皮带轮
14	5/16-18 x 4 六角头螺钉	6	防粘润滑剂	未规定	抛油环盖
15	3/8-16 x 1 接头内六角螺钉	16	防粘润滑剂	183 英寸 • 磅	轴台盖
17	1/4-20 x 5/8 内六角螺钉	4	防粘润滑剂	144 英寸 • 磅	轴台抛油环
18	3/8-16 x 3/4 内六角螺钉	8	防粘润滑剂	252 英寸 • 磅	机箱犁
19	3/8-16 x 1 定位螺钉	2	防粘润滑剂	75 英寸 • 磅	进料加速泵
20	1/2-13 x 1 定位螺钉	1	防粘润滑剂	265 英寸 • 磅	进料加速泵
22	3/8-16 x 1 内六角螺钉	12	防粘润滑剂	252 英寸 • 磅	转鼓延伸节
23	10-24 x 1/4 定位螺钉	2	防粘润滑剂	不适用	机箱抛油环
24	5/16-18 x 3/4 内六角螺钉	32	防粘润滑剂	144 英寸 • 磅	耐磨插件
25	3/8-16 x 3/4 接头内六角螺钉	4	防粘润滑剂	183 英寸 • 磅	固体头犁
27	1/2-13 x 1 内六角螺钉	8	防粘润滑剂	53 英寸 • 磅	进料喷嘴
29	5/8-11 x 2-1/4 六角头螺钉	4	防粘润滑剂	197 英尺 • 磅	轴台
30	#8 钉销 (7/16-20 x 2-1/2)	4	防粘润滑剂	不适用	轴台
31	#7 钉销 (3/8-24 x 2-1/2)	4	防粘润滑剂	不适用	轴台
32	#8 塞	1	防粘润滑剂	35 英尺 • 磅	转鼓延伸节
38	3/8-16 x 2-1/2 六角头螺钉	4	防粘润滑剂	未规定	进料管安装块
41	3/8-16 x 1-1/2 六角头螺钉	4	防粘润滑剂	未规定	进料管支撑法兰

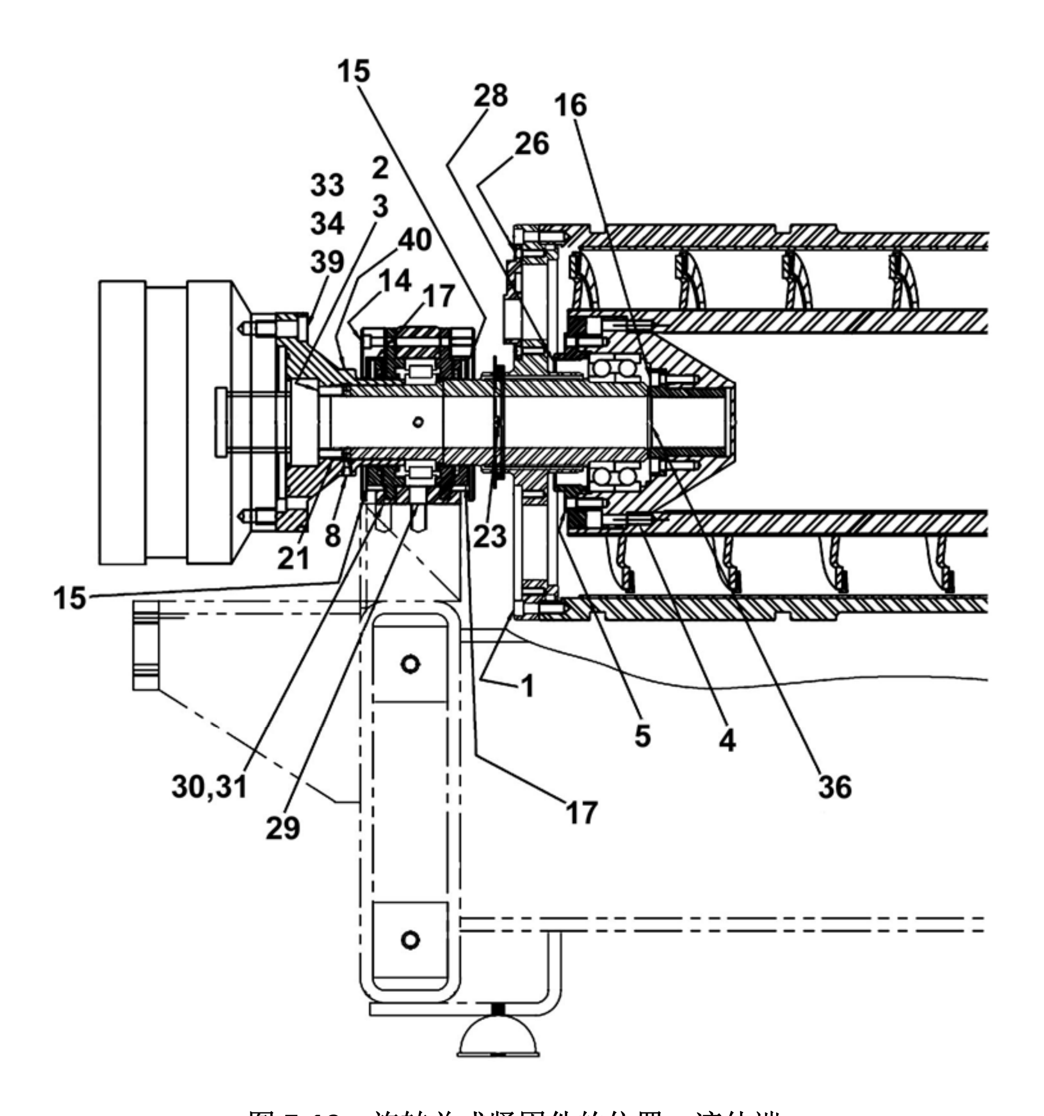


图 **5-19**：旋转总成紧固件的位置—液体端

液体端扭矩紧固件的技术规格					
编号	描述	数量	润滑剂	扭矩	位置
1	3/8-16 x 1-1/4 内六角螺钉	12	防粘润滑剂	252 英寸・磅	液体端转鼓头
2	5/16 x 1 钉销	*	乐泰 680	不适用	液体端转鼓头
3	5/16 x 5/16 x 3 销键	1	不适用	不适用	液体端转鼓头
4	3/8-16 x 1-1/2 内六角螺钉	8	防粘润滑剂	252 英寸・磅	液体端轴承箱
5	3/8-16 x 1 内六角螺钉	4	防粘润滑剂	252 英寸・磅	液体端密封座
8	1/4 NPT x 3/4 滑脂接头	2	不适用	不适用	液体端转鼓头
13	1/4-20 x 1 内六角螺钉	8	防粘润滑剂	83 英寸・磅	皮带轮
14	5/16-18 x 4 六角头螺钉	6	防粘润滑剂	未规定	抛油环盖
15	3/8-16 x 1 接头内六角螺钉	16	防粘润滑剂	183 英寸・磅	轴台盖
16	3/8-16 x 1 内六角螺钉	8	防粘润滑剂	252 英寸・磅	花键毂
17	1/4-20 x 5/8 内六角螺钉	4	防粘润滑剂	144 英寸・磅	轴台抛油环
21	5/16-18 x 1 内六角螺钉	*	乐泰 262	300 英寸・磅	Rotodiff/齿轮箱法兰
23	10-24 x 1/4 定位螺钉	2	防粘润滑剂	不适用	机箱抛油环
26	5/16-18 x 7/8 内六角螺钉	12	防粘润滑剂	144 英寸・磅	排污口
28	3/8-16 x 1/2 定位螺钉	2	防粘润滑剂	不适用	密封座
29	5/8-11 x 2-1/4 六角头螺钉	4	防粘润滑剂	197 英尺・磅	轴台
30	#8 钉销(7/16-20 x 2-1/2)	4	防粘润滑剂	不适用	轴台
31	#7 钉销 (3/24-20 x 2-1/2)	4	防粘润滑剂	不适用	轴台
34	5/16-18 x 3/4 内六角螺钉	6	防粘润滑剂	不适用	齿轮箱到齿轮箱法兰
35	3mm 定位螺钉	**	防粘润滑剂	不适用	端口座
36	3/8 x 1 钉销	2	乐泰 680	不适用	花键毂
37	30 x 1.5mm x 1.4 扣环	**	不适用	不适用	Rotodiff 端口座
40	5/16-18 x 1/2 定位螺钉	1	防粘润滑剂	不适用	法兰到销键

*2 - 4 指序列号低于 CF000272 的
2 指序列号为 CF000272 — CF000678 之间的
0 指序列号高于 CF000979 的

*21 - 4 指序列号低于 CF000272 的
6 指序列号为 CF000272 — CF000678 之间的
9 指序列号高于 CF000979 的

**35 & 37 - 高于序列号 CF000678 的未使用的

推荐的备品备件

下表列出了一台 DE-1000 GBD 离心机两年运行推荐使用的备品备件清单。但是，由于无法对所有部件可能更换时间做出预判，因此还要根据用户对类似设备的使用经验来确定完整的备件库存量。

推荐的备品备件— DE-1000 GBD 离心机			
部件号	描述	易消耗	两年数量
BELT-5G3V-1000	传动皮带这，直径为 8” - 10.6”皮带轮	是	1
BELT-5G3V-1060	传动皮带，直径为 11.1” - 13.1” 皮带轮	是	1
BSS-FNQ2	二次熔断器，CPT	否	4
BSS-LPCC30	熔断器，低峰值, 30 A, CC 等级	否	1
C000-RA-110-00	滑脂，高速，主轴承，16 盎司	是	4
CA1595X1/2-6	隔离器支架	否	4
CHE-SRI-2	滑脂，标准，主轴承/传输装置，14.5 盎司，管	是	12
CHE-GST-ISO-32	油，液力偶合器	是	1
CS10-EL-725-00	熔断器，延时, 1 A, CC 等级	否	4
CS10-RA-310-00	支撑轴承内侧密封件	否	2
CS10-RA-311-00	支撑轴承外侧密封件	否	2
CS10-RA-312-00	止推轴承密封件	否	2
CS10-RA-316-00	O 形环, 液体转鼓头	否	2
CS10-RA-321-00	O 形环, 液体端外部	否	1
CS10-RA-322-00	O 形环, 液体端内部	否	1
CS10-RA-323-00	O 形环, 进料加速器	否	1
CS10-RA-324-00	进料喷嘴 O 形环	否	4
CS10-RA-325-00	O 形环，固体端	否	1
CS10-RA-510-00	传输装置止推轴承	否	2
CS10-RA-511-00	传输装置支撑轴承	否	1
CS10-RA-512-00	固体端主轴承	否	1
CS10-RA-513-00	液体端主轴承	否	1
CS10-RA-629-TC	钨进料喷嘴	否	4
CS10-RA-630-IC	固料排放耐磨插件 (8 片)	是	2 套

推荐的备品备件— DE-1000 GBD 离心机			
部件号	描述	易消耗	两年数量
CS10-RA-634-IC	机箱犁	是	2 对
CS10-RA-650-IC	转鼓头犁	是	4 对
SHELL-OMALA320G	机油，齿轮箱	是	1
9537-00	进料加速器	是	1
9540-00	进料管	否	1

故障排除

尽管设备故障未必是因为操作错误造成的误动作所致，但其它原因也会造成设备出现不必要的停车，所以应当尽快予以纠正。本章介绍的故障排除步骤有助于维护技师对误操作进行隔离并及时进行纠正。

故障排除步骤

故障原因分析应当遵循从最简单原因向复杂原因分析的逻辑顺序。最难处理的是无法预见的停车或不能起动。在处理复杂可能性之前，应当首先消除显见的误操作原因。

由于一个误操作可能有不止一个原因，因此维护技师必须按顺序消除所有可能的故障原因并且在每一步故障排查过程中都及时采取纠正措施。在修改操作步骤是最佳做法的地方，将提供适应的建议。

离心机不可预见地停车一般都是由于停电而使 50 HP 电动机关停所造成的。离心机电气控制系统的关键部位均装有安全元件，确保当包括电机温度、振动、或传输装置的扭矩等在内的安全参数超出允许范围时关停电动机。停电原因可能不止一个，其中包括现场电源故障。

故障排除表包括故障模式、可能的原因以及推荐做法。本步骤中的所有电气连接检查必须在离心机断开电源的情况下进行。进行任何电气连接之前，首先要对设备闭锁电源并挂牌上锁。



警示！电气连接检查必须在离心机断开电源的情况下进行。进行电气连接检查之前，首先要闭锁电源并挂牌上锁。

除故障排查表以外，维护技师应参考第 6 章中适用的示意图和接线图，以及第 1 章中的操作描述和理论帮助进行故障排除。

检查传输装置是否堵塞

故障排除第一步应当是判断传输装置是否堵塞。请按以下方式检查传输装置是否堵塞：

1. 对离心机停车、闭锁电源并挂牌上锁。
2. 拆除齿轮箱的过载安全保护总成，一边阻止转鼓旋转，一边试着旋转齿轮箱的小齿轮轴。如果小齿轮能够独立于转鼓而旋转，说明传输装置没有堵塞。
3. 用水或蒸汽冲刷清理传输装置的堵塞部位。如果传输装置没有堵塞，请按以下故障排除表的内容进行故障排除。

离心机故障排除—齿轮箱驱动	
可能的原因	隔离步骤与补救行动
故障模式 1：离心机无法起动	
没电。	确认离心机电源无误并且主接触器闭合。纠正任何缺陷。
振动开关脱扣。	按住振动开关的复位按钮试着重新起动离心机（参见第 4 章—操作）。如果机器不能起动或者起动后很快又停车，要继续进行故障排查。
过扭矩开关脱扣后未复位。	对过载安全和过扭矩开关进行复位（参见 DER05104）。试着起动离心机（参见第 4 章内容），并且监控振动和排料是否有任何异常。发现例如无固体排出等异常情况时，立即停止离心机。
故障模式 2：离心机起动，但起动后不久出现停车。	
振动开关由于起动时振动过度而脱扣。	按住振动开关的复位按钮试着重新起动离心机（参见第 4 章—操作）。如果机器不能起动或者起动后很快又停车，要继续进行故障排查。
过扭矩开关由于传输装置扭矩过大而脱扣。	当离心机完全停止后，打开盖子检查转鼓内部和传输装置是否有固体物料堆积阻碍转动。如果堵料很明显，要用水冲洗转鼓和传输装置，直到排出的液体中不再有固体。如果室温水无法清除堵塞物，试着用热水或蒸汽进行清理。如果热水或蒸汽冲刷仍然无法清除转鼓上的固体，则需拆除旋转总成，拆除传输装置，采用人工方式将所有固体物料从传输装置和转鼓内部清理干净。经过清理之后，重新将传输装置安装到转鼓中，然后重新安装好旋转总成。重新起动离心机（参见第 4 章内容），并且监控振动和排料是否有任何异常。如遇出现无固体排出等异常情况，应立即停下离心机，并继续进行故障排查。

离心机故障排除—齿轮箱驱动	
可能的原因	**隔离步骤与补救行动**
故障模式 3：离心机自动停车	
没电。	检查离心机的电源，并检查保险丝。纠正停电故障，更换烧断的保险丝。
电气连接有误。	重新检查电气连接（参见第 3 章内容），并更正任何缺陷。
振动开关脱扣。	按住振动开关的复位按钮试着重新起动离心机（参见第 4 章）。如果机器不能起动或者起动后很快又停车，要继续进行故障排查。
转鼓堵料造成过扭矩开关因为传输装置扭矩太高而跳闸。	当离心机完全停止后，打开盖子检查转鼓内部和传输装置是否有固体物料堆积阻碍转动。如果堵料很明显，要用水冲洗转鼓和传输装置，直到排出的液体中不再有固体。如果无法清除转鼓上的固体，需要拆除旋转总成，拆除传输装置，采用人工方式将所有固体物料从传输装置和转鼓内部清理干净。经过清理之后，重新将传输装置安装到转鼓中，然后重新安装好旋转总成。复位过载安全和过扭矩限制开关。
驱动电机过热保护开关和/或起动器热过载保护开关由于电流过大而脱扣。	留出足够的时间对过载保护装置进行复位，然后按下离心机起动器的 RESET（复位）按钮。按下 CENTRIFUGE ON（离心机开动）按钮试着重新起动离心机。如果设备起动，需监控振动和排料是否有任何异常情况。发现例如无固体排出等异常情况时，立即停止离心机。试着重新起动离心机之前，先要确定出现异常的原因并加以更正。
	切断电源并且按下 CENTRIFUGE ON（离心机开动）按钮后，检查 CENTRIFUGE ON（离心机开动）开关 X1 号线接地的电气连接。如果发现开路，需检查以下线号之间的控制系统元件的接地电气连接： 自　到　是否有电气连接 X1　2　按下 CENTRIFUGE ON （离心机开动）并重新检查。 2　4　按下 RESET （复位）按钮并重新检查。 4　5　按二振动开关复位按钮。 5A　6　让电机冷却下来并重新检查。 若任何测试失败，需更换受到影响的测试点之间的元件。
	如果以上所有点都发现电气连接，需检查 6 号线的接地电气连接。如果未发现电气连接，需更换继电器 CR1。

离心机故障排除—齿轮箱驱动	
可能的原因	隔离步骤与补救行动
故障模式 3：离心机自动停车（续）	
驱动电机过热保护开关和/或起动器热过载保护开关由于电流过大而脱扣（续）。	分别检查通过每个电机绕组端子 T1、 T2 和 T3 接地连接的电气连接。如果任何绕组的接地未发现有电气连接，需更换电机。如果所有绕组接地都有电气连接，则需重新对所有电气连接进行检查，以便对有缺陷的控制系统部件进行定位。更换有缺陷部件。
	按下离心机起动器 RESET（复位）按钮，然后试着重新起动离心机。如果设备起动，需监控振动和排料是否有任何异常情况。发现例如无固体排出等异常情况时，立即停止离心机。试着重新起动离心机之前，先要确定出现异常的原因并加以更正。
故障模式 4：进料泵不能起动。	
进料泵的电机因为电流过大出现过热。	留有足够的时间让电机冷却，然后按下 PUMP ON（泵开动）按钮试着重新起动进料泵。如果泵起动，需调整进料速率以免泵出现过载，并且要监控泵的运行情况直到确信泵不再出现过载。
进料泵电机过热保护开关和/或起动器热过载开关因为电流过大而脱扣。	留出足够的时间让起动器的过载保护装置冷却，然后按下泵的起动器 RESET（复位）按钮。按下 PUMP ON（泵开动）按钮试着重新起动离心机。如果泵起动，需调整进料速率以免泵出现过载，并且要监控泵的运行情况直到确信泵不再出现过载。
泵的运行继电器 CR2 有缺陷。	对离心机停车、闭锁电源并挂牌上锁。断开离心机继电器 CR1 的导线 10，检查端子 10 接地的电气连续性。如果未发现电气连接，需更换继电器。
故障模式 5：振动过度导致振动开关脱扣	
内壁挂的料饼垂落或轴瓦移位造成转鼓失衡。	当离心机完全停止后，打开盖子检查转鼓内部和传输装置是否有固体物料堆积阻碍转动。用水冲洗转鼓和传输装置直到排出液体中不再有固体。如果无法清除转鼓上的固体，或者发现轴瓦移位，需要拆除旋转总成，拆除传输装置，采用人工方式将所有固体物料和移位的轴瓦从传输装置和转鼓内部清理干净。经过清理之后，重新将传输装置安装到转鼓中，然后重新安装好旋转总成。
齿轮箱对正不良。	根据预防性维护摂的内容对齿轮箱加垫片。
构件松动。	检查构件是否松动，并根据需要进行紧固。

离心机故障排除—齿轮箱驱动	
可能的原因	**隔离步骤与补救行动**
轴承磨损。	做检查，遇有磨损及时更换。
未安装挠性连接件。	在需要处安装挠性连接件。
故障模式 6：干燥不完全	
液池深度太深。	调节转鼓头上的液体排出口。
传输装置的速度太高。	降低传输装置的速度。
进料速率太高。	降低进料速率。
转鼓速度太低。	提高转鼓速度。
故障模式 7： 排出液体的澄清度不好	
液池深度太深。	调节转鼓头上的液体排出口。
进料温度太高。	调节温度。
进料的物料降级老化。	检查进料的颗粒粒度。 如果粒度太大，要断开离心机进料直到进料达到令人满意的程度。

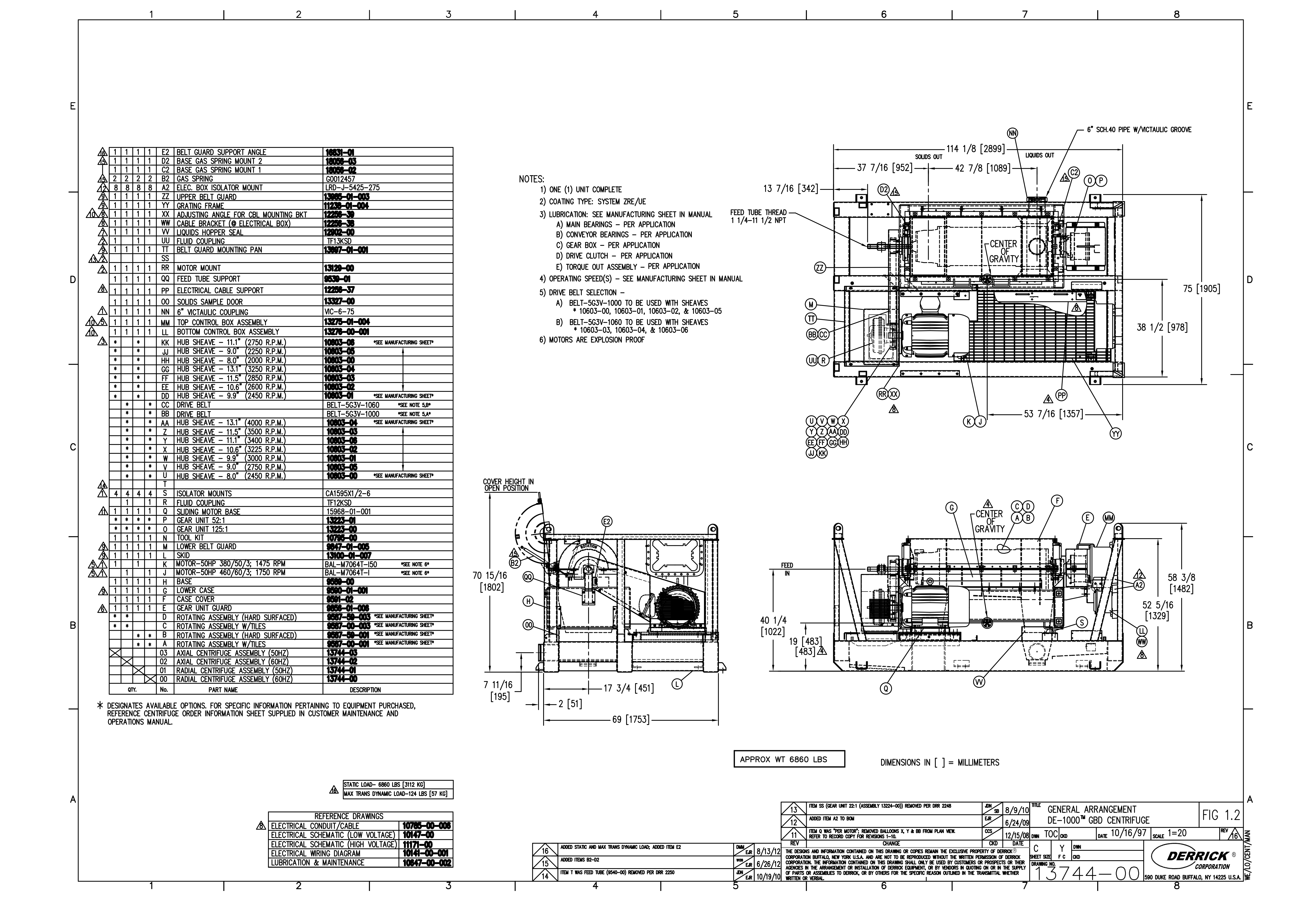


第 8 章：参考图纸

概述

本章包括买方所购 Derrick 设备的工程设计图纸。这些图纸有助于进行故障排除、修理和部件订购。

图号	标题
13744-00 -	总体配置图 - DE-1000 GBD 离心机
9587-00-001 -	旋转总成 - DE-1000 离心机 (径流)
9587-00-003 -	旋转总成- DE-1000 离心机 (轴流)
11372-01 -	齿轮装置 - DE-1000 GBD 离心机 - 52:1
11372-02 -	齿轮装置 - DE-1000 GBD 离心机- 125:1
13223-00 -	过载安全装置总成 - DE-1000 GBD 离心机 - 125:1 和 52:1
10147-00 -	电气控制系统示意图 - DE-1000 GBD 离心机
10141-00-001 -	电气接线图 - DE-1000 GBD 离心机
10647-00-002 -	润滑和维护计划 - DE-1000 离心机
10785-00-006 -	电气导线 / 电缆图
11171-00 -	高压设备示意图 - DE-1000 离心机(50/60 Hz)
13275-00-004 -	控制箱总成 - DE-1000 GBD 离心机
14894-00 -	旋转装置总成-硬件部件清单



REV	QTY.				No.	PART NAME	DESCRIPTION	
16	1	1	1	1	E2	BELT GUARD SUPPORT ANGLE	16831-01	
15	1	1	1	1	D2	BASE GAS SPRING MOUNT 2	18056-03	
	1	1	1	1	C2	BASE GAS SPRING MOUNT 1	18056-02	
15	2	2	2	2	B2	GAS SPRING	G0012457	
12	8	8	8	8	A2	ELEC. BOX ISOLATOR MOUNT	LRD-J-5425-275	
9	1	1	1	1	ZZ	UPPER BELT GUARD	13985-01-003	
9	1	1	1	1	YY	GRATING FRAME	11238-01-004	
10, 8	1	1	1	1	XX	ADJUSTING ANGLE FOR CBL MOUNTING BKT	12256-39	
8	1	1	1	1	WW	CABLE BRACKET (@ ELECTRICAL BOX)	12256-38	
7	1	1	1	1	VV	LIQUIDS HOPPER SEAL	12902-00	
2	1		1		UU	FLUID COUPLING	TF13KSD	
9	1	1	1	1	TT	BELT GUARD MOUNTING PAN	13897-01-001	
13, 2					SS			
2	1	1	1	1	RR	MOTOR MOUNT	13129-00	
	1	1	1	1	QQ	FEED TUBE SUPPORT	9539-01	
8	1	1	1	1	PP	ELECTRICAL CABLE SUPPORT	12256-37	
	1	1	1	1	OO	SOLIDS SAMPLE DOOR	13327-00	
1	1	1	1	1	NN	6" VICTAULIC COUPLING	VIC-6-75	
10, 5	1	1	1	1	MM	TOP CONTROL BOX ASSEMBLY	13275-01-004	
10	1	1	1	1	LL	BOTTOM CONTROL BOX ASSEMBLY	13276-00-001	
3	*		*		KK	HUB SHEAVE - 11.1" (2750 R.P.M.)	10803-06	*SEE MANUFACTURING SHEET*
	*		*		JJ	HUB SHEAVE - 9.0" (2250 R.P.M.)	10803-05	
	*		*		HH	HUB SHEAVE - 8.0" (2000 R.P.M.)	10803-00	
	*		*		GG	HUB SHEAVE - 13.1" (3250 R.P.M.)	10803-04	
	*		*		FF	HUB SHEAVE - 11.5" (2850 R.P.M.)	10803-03	
	*		*		EE	HUB SHEAVE - 10.6" (2600 R.P.M.)	10803-02	
	*		*		DD	HUB SHEAVE - 9.9" (2450 R.P.M.)	10803-01	*SEE MANUFACTURING SHEET*
		*		*	CC	DRIVE BELT	BELT-5G3V-1060	*SEE NOTE 5,B*
		*		*	BB	DRIVE BELT	BELT-5G3V-1000	*SEE NOTE 5,A*
		*		*	AA	HUB SHEAVE - 13.1" (4000 R.P.M.)	10803-04	*SEE MANUFACTURING SHEET*
		*		*	Z	HUB SHEAVE - 11.5" (3500 R.P.M.)	10803-03	
		*		*	Y	HUB SHEAVE - 11.1" (3400 R.P.M.)	10803-06	
		*		*	X	HUB SHEAVE - 10.6" (3225 R.P.M.)	10803-02	
		*		*	W	HUB SHEAVE - 9.9" (3000 R.P.M.)	10803-01	
		*		*	V	HUB SHEAVE - 9.0" (2750 R.P.M.)	10803-05	
		*		*	U	HUB SHEAVE - 8.0" (2450 R.P.M.)	10803-00	*SEE MANUFACTURING SHEET*
14					T			
1	4	4	4	4	S	ISOLATOR MOUNTS	CA1595X1/2-6	
		1		1	R	FLUID COUPLING	TF12KSD	
11	1	1	1	1	Q	SLIDING MOTOR BASE	15968-01-001	
	*	*	*	*	P	GEAR UNIT 52:1	13223-01	
	*	*	*	*	O	GEAR UNIT 125:1	13223-00	
	1	1	1	1	N	TOOL KIT	10795-00	
9	1	1	1	1	M	LOWER BELT GUARD	9847-01-005	
9	1	1	1	1	L	SKID	13100-01-007	
5, 1	1		1		K	MOTOR-50HP 380/50/3; 1475 RPM	BAL-M7064T-I50	*SEE NOTE 6*
5, 1		1		1	J	MOTOR-50HP 460/60/3; 1750 RPM	BAL-M7064T-I	*SEE NOTE 6*
	1	1	1	1	H	BASE	9589-00	
9	1	1	1	1	G	LOWER CASE	9590-01-001	
	1	1	1	1	F	CASE COVER	9591-02	
6	1	1	1	1	E	GEAR UNIT GUARD	9856-01-006	
	*	*			D	ROTATING ASSEMBLY (HARD SURFACED)	9587-59-003	*SEE MANUFACTURING SHEET*
	*	*			C	ROTATING ASSEMBLY W/TILES	9587-00-003	*SEE MANUFACTURING SHEET*
			*	*	B	ROTATING ASSEMBLY (HARD SURFACED)	9587-59-001	*SEE MANUFACTURING SHEET*
			*	*	A	ROTATING ASSEMBLY W/TILES	9587-00-001	*SEE MANUFACTURING SHEET*
	X				03	AXIAL CENTRIFUGE ASSEMBLY (50HZ)	13744-03	
		X			02	AXIAL CENTRIFUGE ASSEMBLY (60HZ)	13744-02	
			X		01	RADIAL CENTRIFUGE ASSEMBLY (50HZ)	13744-01	
				X	00	RADIAL CENTRIFUGE ASSEMBLY (60HZ)	13744-00	

* DESIGNATES AVAILABLE OPTIONS. FOR SPECIFIC INFORMATION PERTAINING TO EQUIPMENT PURCHASED, REFERENCE CENTRIFUGE ORDER INFORMATION SHEET SUPPLIED IN CUSTOMER MAINTENANCE AND OPERATIONS MANUAL.

NOTES:

1) ONE (1) UNIT COMPLETE
2) COATING TYPE: SYSTEM ZRE/UE
3) LUBRICATION: SEE MANUFACTURING SHEET IN MANUAL
   A) MAIN BEARINGS - PER APPLICATION
   B) CONVEYOR BEARINGS - PER APPLICATION
   C) GEAR BOX - PER APPLICATION
   D) DRIVE CLUTCH - PER APPLICATION
   E) TORQUE OUT ASSEMBLY - PER APPLICATION
4) OPERATING SPEED(S) - SEE MANUFACTURING SHEET IN MANUAL
5) DRIVE BELT SELECTION -
   A) BELT-5G3V-1000 TO BE USED WITH SHEAVES
      * 10603-00, 10603-01, 10603-02, & 10603-05
   B) BELT-5G3V-1060 TO BE USED WITH SHEAVES
      * 10603-03, 10603-04, & 10603-06
6) MOTORS ARE EXPLOSION PROOF

REFERENCE DRAWINGS	
ELECTRICAL CONDUIT/CABLE	10765-00-006
ELECTRICAL SCHEMATIC (LOW VOLTAGE)	10147-00
ELECTRICAL SCHEMATIC (HIGH VOLTAGE)	11171-00
ELECTRICAL WIRING DIAGRAM	10141-00-001
LUBRICATION & MAINTENANCE	10647-00-002

REV	CHANGE	CKD	DATE
16	ADDED STATIC AND MAX TRANS DYNAMIC LOAD; ADDED ITEM E2	EJR	8/13/12
15	ADDED ITEMS B2-D2	EJR	6/26/12
14	ITEM T WAS FEED TUBE (9540-00) REMOVED PER DRR 2250	JDN	10/19/10
13	ITEM SS (GEAR UNIT 22:1 (ASSEMBLY 13224-00)) REMOVED PER DRR 2248	JDN SB	8/9/10
12	ADDED ITEM A2 TO BOM	EJR	6/24/09
11	ITEM Q WAS "PER MOTOR"; REMOVED BALLOONS X, Y & BB FROM PLAN VIEW. REFER TO RECORD COPY FOR REVISIONS 1-10.	CCS	12/15/08

TITLE: GENERAL ARRANGEMENT DE-1000™ GBD CENTRIFUGE

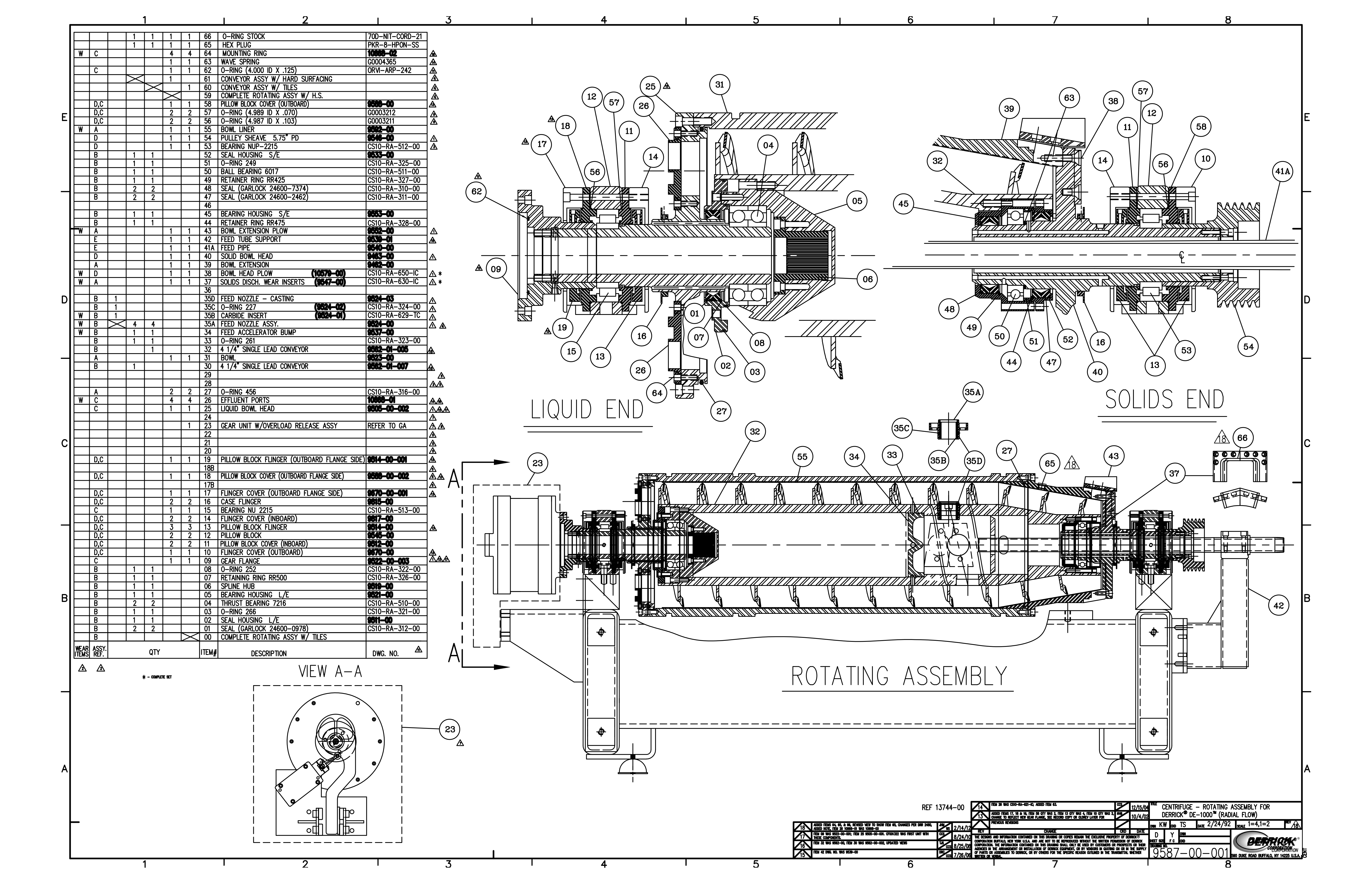
FIG 1.2

DWN TOC | DATE 10/16/97 | SCALE 1=20 | REV 16 | SHEET SIZE C

DRAWING NO. 13744-00

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

WE/LO/CENT/MAN



WEAR ITEMS	ASSY. REF.	QTY					ITEM#	DESCRIPTION	DWG. NO. △11	
			1	1	1	1	66	O-RING STOCK	70D-NIT-CORD-21	
			1	1	1	1	65	HEX PLUG	PKR-8-HPON-SS	
W	C				4	4	64	MOUNTING RING	10668-02	△18
					1	1	63	WAVE SPRING	G0004365	△14
	C				1	1	62	O-RING (4.000 ID X .125)	ORVI-ARP-242	△11
		X		1			61	CONVEYOR ASSY W/ HARD SURFACING		△4
			X		1		60	CONVEYOR ASSY W/ TILES		△4
				X			59	COMPLETE ROTATING ASSY W/ H.S.		△4
	D,C				1	1	58	PILLOW BLOCK COVER (OUTBOARD)	9588-00	△13
	D,C				2	2	57	O-RING (4.989 ID X .070)	G0003212	△9
	D,C				2	2	56	O-RING (4.987 ID X .103)	G0003211	△9
W	A				1	1	55	BOWL LINER	9502-00	
	D				1	1	54	PULLEY SHEAVE 5.75" PD	9546-00	△1
	D				1	1	53	BEARING NUP-2215	CS10-RA-512-00	△3
	B		1	1			52	SEAL HOUSING S/E	9533-00	
	B		1	1			51	O-RING 249	CS10-RA-325-00	
	B		1	1			50	BALL BEARING 6017	CS10-RA-511-00	
	B		1	1			49	RETAINER RING RR425	CS10-RA-327-00	
	B		2	2			48	SEAL (GARLOCK 24600-7374)	CS10-RA-310-00	
	B		2	2			47	SEAL (GARLOCK 24600-2462)	CS10-RA-311-00	
							46			
	B		1	1			45	BEARING HOUSING S/E	9553-00	
	B		1	1			44	RETAINER RING RR475	CS10-RA-328-00	
W	A				1	1	43	BOWL EXTENSION PLOW	9552-00	△1
	E				1	1	42	FEED TUBE SUPPORT	9539-01	△15
	E				1	1	41A	FEED PIPE	9540-00	
	D				1	1	40	SOLID BOWL HEAD	9463-00	△1
	A				1	1	39	BOWL EXTENSION	9462-00	
W	D				1	1	38	BOWL HEAD PLOW (10579-00)	CS10-RA-650-IC	△1 *
W	A				1	1	37	SOLIDS DISCH. WEAR INSERTS (9547-00)	CS10-RA-630-IC	△1 *
							36			
	B	1					35D	FEED NOZZLE - CASTING	9524-03	△1
	B	1					35C	O-RING 227 (9524-02)	CS10-RA-324-00	△1
W	B	1					35B	CARBIDE INSERT (9524-01)	CS10-RA-629-TC	△1
W	B	X	4	4			35A	FEED NOZZLE ASSY.	9524-00	△1 △4
W	B		1	1			34	FEED ACCELERATOR BUMP	9537-00	
	B		1	1			33	O-RING 261	CS10-RA-323-00	
	B			1			32	4 1/4" SINGLE LEAD CONVEYOR	9562-01-005	△16
	A				1	1	31	BOWL	9523-00	
	B		1				30	4 1/4" SINGLE LEAD CONVEYOR	9562-01-007	△16
							29			△5
							28			△2 △5
	A				2	2	27	O-RING 456	CS10-RA-316-00	
W	C				4	4	26	EFFLUENT PORTS	10668-01	△14 △18
	C				1	1	25	LIQUID BOWL HEAD	9505-00-002	△1 △12 △17
							24			△7
						1	23	GEAR UNIT W/OVERLOAD RELEASE ASSY	REFER TO GA	△7 △8
							22			△5
							21			△5
							20			△5
	D,C				1	1	19	PILLOW BLOCK FLINGER (OUTBOARD FLANGE SIDE)	9514-00-001	△13
							18B			△5
	D,C				1	1	18	PILLOW BLOCK COVER (OUTBOARD FLANGE SIDE)	9588-00-002	△5 △13
							17B			△5
	D,C				1	1	17	FLINGER COVER (OUTBOARD FLANGE SIDE)	9670-00-001	△13
	D,C				2	2	16	CASE FLINGER	9615-00	
	C				1	1	15	BEARING NU 2215	CS10-RA-513-00	
	D,C				2	2	14	FLINGER COVER (INBOARD)	9617-00	
	D,C				3	3	13	PILLOW BLOCK FLINGER	9514-00	△13
	D,C				2	2	12	PILLOW BLOCK	9545-00	
	D,C				2	2	11	PILLOW BLOCK COVER (INBOARD)	9512-00	
	D,C				1	1	10	FLINGER COVER (OUTBOARD)	9670-00	△13
	C				1	1	09	GEAR FLANGE	9522-00-003	△1 △12 △17
	B		1	1			08	O-RING 252	CS10-RA-322-00	
	B		1	1			07	RETAINING RING RR500	CS10-RA-326-00	
	B		1	1			06	SPLINE HUB	9519-00	
	B		1	1			05	BEARING HOUSING L/E	9521-00	
	B		2	2			04	THRUST BEARING 7216	CS10-RA-510-00	
	B		1	1			03	O-RING 266	CS10-RA-321-00	
	B		1	1			02	SEAL HOUSING L/E	9511-00	
	B		2	2			01	SEAL (GARLOCK 24600-0978)	CS10-RA-312-00	
	B					X	00	COMPLETE ROTATING ASSY W/ TILES		

△2 △2

* - COMPLETE SET

REF 13744-00

REV	CHANGE	CKD	DATE
18	ADDED ITEMS 64, 65, & 66, REVISED VIEW TO SHOW ITEM 65, CHANGES PER DRR 2480, ADDED NOTE, ITEM 26 10668-01 WAS 10668-00	JHM / WS	2/14/12
17	ITEM 09 WAS 9522-00-001; ITEM 25 9505-00-001. CF001322 WAS FIRST UNIT WITH THESE COMPONENTS.	CCS	8/24/10
16	ITEM 32 WAS 9562-00, ITEM 30 WAS 9562-00-002, UPDATED VIEWS	TJS / CCS	8/25/08
15	ITEM 42 DWG. NO. WAS 9539-00	DRC / CCS	7/26/06
14	ITEM 26 WAS CS10-RA-621-IC; ADDED ITEM 63.	CCS	12/15/04
13	ADDED ITEMS 17, 18 & 19, ITEM 58 QTY WAS 2, ITEM 13 QTY WAS 4, ITEM 10 QTY WAS 2, CHANGE TO REFLECT NEW GEAR FLANGE, SEE RECORD COPY OR OLDREV LAYER FOR	NVB	10/4/02
	PREVIOUS REVISIONS		

TITLE: CENTRIFUGE - ROTATING ASSEMBLY FOR DERRICK® DE-1000™ (RADIAL FLOW)

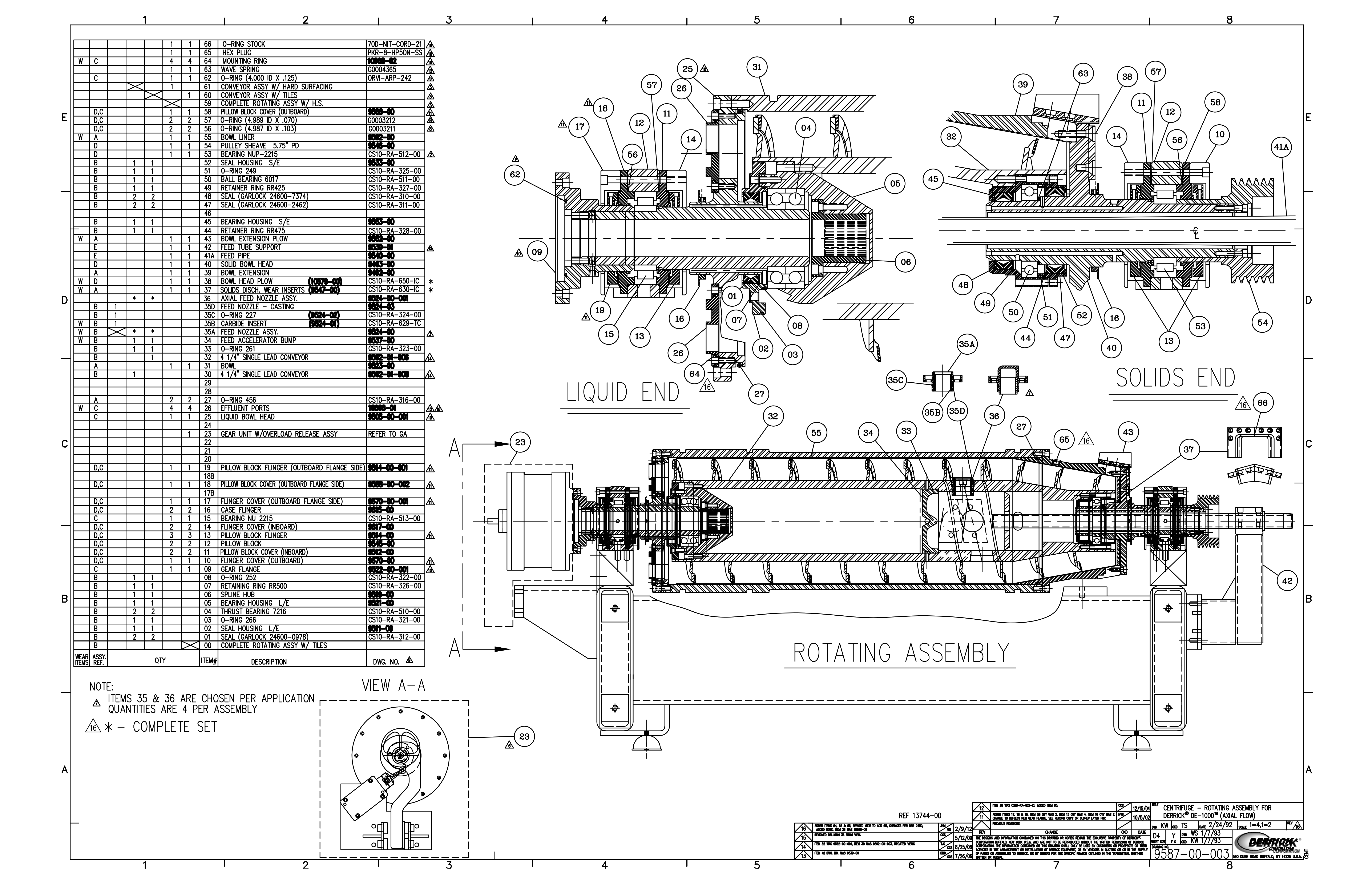
DWN KW | CKD TS | DATE 2/24/92 | SCALE 1=4,1=2 | REV 18

SHEET SIZE D | Y F C

DRAWING NO. 9587-00-001

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT



WEAR ITEMS	ASSY. REF.	QTY					ITEM#	DESCRIPTION	DWG. NO. △9	
					1	1	66	O-RING STOCK	70D-NIT-CORD-21	△16
					1	1	65	HEX PLUG	PKR-8-HP50N-SS	△16
W	C				4	4	64	MOUNTING RING	10668-02	△16
					1	1	63	WAVE SPRING	G0004365	△12
	C				1	1	62	O-RING (4.000 ID X .125)	ORVI-ARP-242	△9
			X		1		61	CONVEYOR ASSY W/ HARD SURFACING		△3
				X		1	60	CONVEYOR ASSY W/ TILES		△3
					X		59	COMPLETE ROTATING ASSY W/ H.S.		△3
	D,C				1	1	58	PILLOW BLOCK COVER (OUTBOARD)	9588-00	△11
	D,C				2	2	57	O-RING (4.989 ID X .070)	G0003212	△8
	D,C				2	2	56	O-RING (4.987 ID X .103)	G0003211	△8
W	A				1	1	55	BOWL LINER	9592-00	
	D				1	1	54	PULLEY SHEAVE 5.75" PD	9546-00	
	D				1	1	53	BEARING NUP-2215	CS10-RA-512-00	△2
	B		1	1			52	SEAL HOUSING S/E	9533-00	
	B		1	1			51	O-RING 249	CS10-RA-325-00	
	B		1	1			50	BALL BEARING 6017	CS10-RA-511-00	
	B		1	1			49	RETAINER RING RR425	CS10-RA-327-00	
	B		2	2			48	SEAL (GARLOCK 24600-7374)	CS10-RA-310-00	
	B		2	2			47	SEAL (GARLOCK 24600-2462)	CS10-RA-311-00	
							46			
	B		1	1			45	BEARING HOUSING S/E	9553-00	
	B		1	1			44	RETAINER RING RR475	CS10-RA-328-00	
W	A				1	1	43	BOWL EXTENSION PLOW	9552-00	
	E				1	1	42	FEED TUBE SUPPORT	9539-01	△13
	E				1	1	41A	FEED PIPE	9540-00	
	D				1	1	40	SOLID BOWL HEAD	9463-00	
	A				1	1	39	BOWL EXTENSION	9462-00	
W	D				1	1	38	BOWL HEAD PLOW (10579-00)	CS10-RA-650-IC	*
W	A				1	1	37	SOLIDS DISCH. WEAR INSERTS (9547-00)	CS10-RA-630-IC	*
			*	*			36	AXIAL FEED NOZZLE ASSY.	9524-00-001	
	B	1					35D	FEED NOZZLE - CASTING	9524-03	
	B	1					35C	O-RING 227 (9524-02)	CS10-RA-324-00	
W	B	1					35B	CARBIDE INSERT (9524-01)	CS10-RA-629-TC	
W	B	X	*	*			35A	FEED NOZZLE ASSY.	9524-00	△3
W	B		1	1			34	FEED ACCELERATOR BUMP	9537-00	
	B		1	1			33	O-RING 261	CS10-RA-323-00	
	B			1			32	4 1/4" SINGLE LEAD CONVEYOR	9562-01-006	△14
	A				1	1	31	BOWL	9523-00	
	B		1				30	4 1/4" SINGLE LEAD CONVEYOR	9562-01-008	△14
							29			
							28			
	A				2	2	27	O-RING 456	CS10-RA-316-00	
W	C				4	4	26	EFFLUENT PORTS	10668-01	△12 △16
	C				1	1	25	LIQUID BOWL HEAD	9505-00-001	△10
							24			
						1	23	GEAR UNIT W/OVERLOAD RELEASE ASSY	REFER TO GA	
							22			
							21			
							20			
	D,C				1	1	19	PILLOW BLOCK FLINGER (OUTBOARD FLANGE SIDE)	9514-00-001	△11
							18B			
	D,C				1	1	18	PILLOW BLOCK COVER (OUTBOARD FLANGE SIDE)	9588-00-002	△11
							17B			
	D,C				1	1	17	FLINGER COVER (OUTBOARD FLANGE SIDE)	9670-00-001	△11
	D,C				2	2	16	CASE FLINGER	9615-00	
	C				1	1	15	BEARING NU 2215	CS10-RA-513-00	
	D,C				2	2	14	FLINGER COVER (INBOARD)	9617-00	
	D,C				3	3	13	PILLOW BLOCK FLINGER	9514-00	△11
	D,C				2	2	12	PILLOW BLOCK	9545-00	
	D,C				2	2	11	PILLOW BLOCK COVER (INBOARD)	9512-00	
	D,C				1	1	10	FLINGER COVER (OUTBOARD)	9670-00	△11
	C				1	1	09	GEAR FLANGE	9522-00-001	△10
	B		1	1			08	O-RING 252	CS10-RA-322-00	
	B		1	1			07	RETAINING RING RR500	CS10-RA-326-00	
	B		1	1			06	SPLINE HUB	9519-00	
	B		1	1			05	BEARING HOUSING L/E	9521-00	
	B		2	2			04	THRUST BEARING 7216	CS10-RA-510-00	
	B		1	1			03	O-RING 266	CS10-RA-321-00	
	B		1	1			02	SEAL HOUSING L/E	9511-00	
	B		2	2			01	SEAL (GARLOCK 24600-0978)	CS10-RA-312-00	
	B					X	00	COMPLETE ROTATING ASSY W/ TILES		

NOTE:

△7 ITEMS 35 & 36 ARE CHOSEN PER APPLICATION QUANTITIES ARE 4 PER ASSEMBLY

△16 * - COMPLETE SET

REF 13744-00

REV	CHANGE	CKD	DATE
16	ADDED ITEMS 64, 65 & 66, REVISED VIEW TO ADD 65, CHANGES PER DRR 2480, ADDED NOTE, ITEM 26 WAS 10668-00	JHM / WS	2/9/12
15	REMOVED BALLOON 36 FROM VIEW.	CCS	5/12/09
14	ITEM 32 WAS 9562-00-001, ITEM 30 WAS 9562-00-003, UPDATED VIEWS	TJS / CCS	8/25/08
13	ITEM 42 DWG. NO. WAS 9539-00	DRC / CCS	7/26/06
12	ITEM 26 WAS CS10-RA-621-IC; ADDED ITEM 63.	CCS	12/15/04
11	ADDED ITEMS 17, 18 & 19, ITEM 58 QTY WAS 2, ITEM 13 QTY WAS 4, ITEM 10 QTY WAS 2, CHANGE TO REFLECT NEW GEAR FLANGE, SEE RECORD COPY OR OLDREV LAYER FOR	NVB	10/5/02
	PREVIOUS REVISIONS		

TITLE: CENTRIFUGE - ROTATING ASSEMBLY FOR DERRICK® DE-1000™ (AXIAL FLOW)

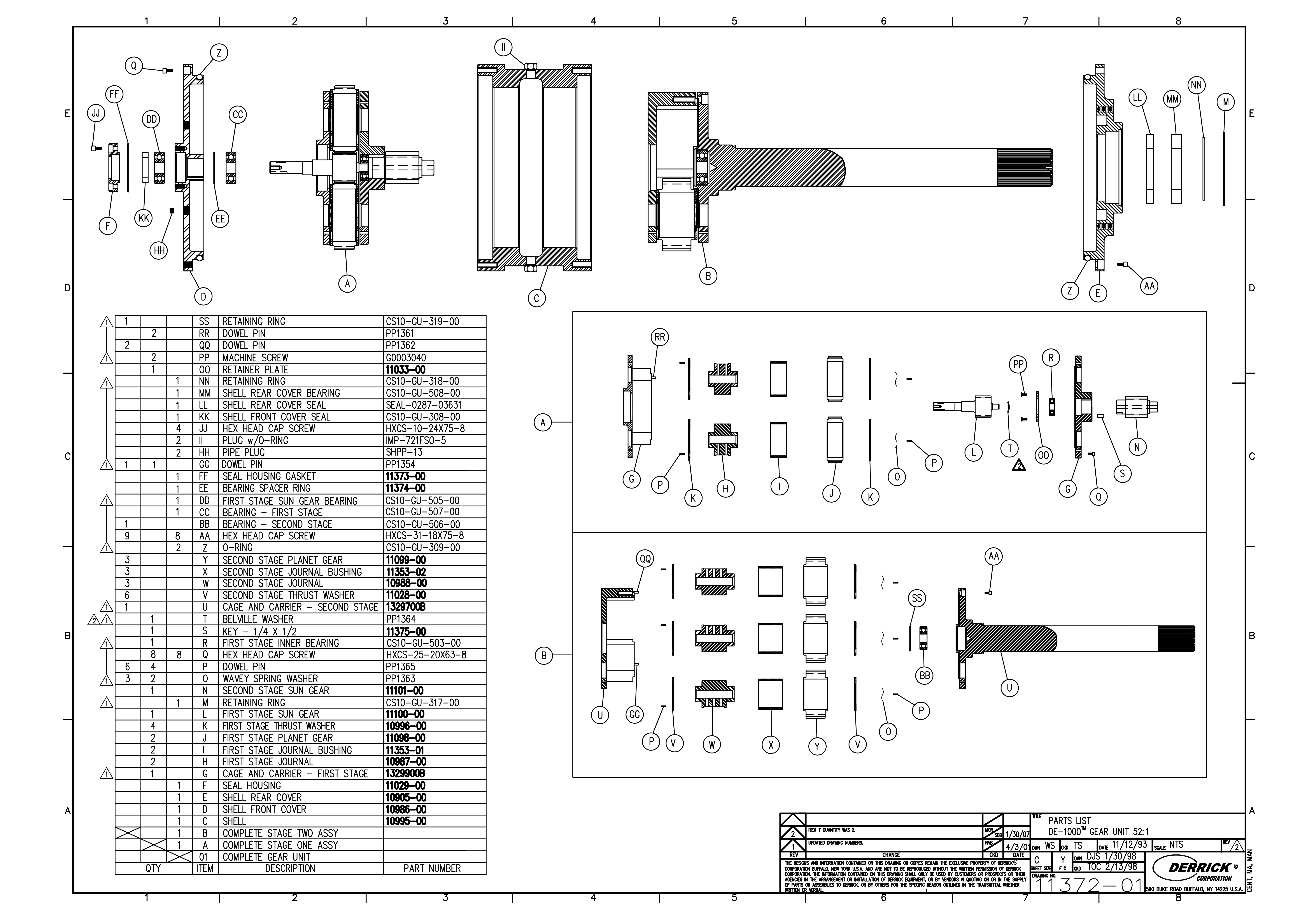
DWN KW | CKD TS | DATE 2/24/92 | SCALE 1=4,1=2 | REV 16

SHEET SIZE D4 | Y F C | DWN WS 1/7/93 | CKD KW 1/7/93

DRAWING NO. 9587-00-003

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT



REV	QTY			ITEM	DESCRIPTION	PART NUMBER
△1	1			SS	RETAINING RING	CS10-GU-319-00
		2		RR	DOWEL PIN	PP1361
	2			QQ	DOWEL PIN	PP1362
△1		2		PP	MACHINE SCREW	G0003040
		1		OO	RETAINER PLATE	**11033-00**
△1			1	NN	RETAINING RING	CS10-GU-318-00
			1	MM	SHELL REAR COVER BEARING	CS10-GU-508-00
			1	LL	SHELL REAR COVER SEAL	SEAL-0287-03631
			1	KK	SHELL FRONT COVER SEAL	CS10-GU-308-00
			4	JJ	HEX HEAD CAP SCREW	HXCS-10-24X75-8
			2	II	PLUG w/O-RING	IMP-721FSO-5
			2	HH	PIPE PLUG	SHPP-13
△1	1	1		GG	DOWEL PIN	PP1354
			1	FF	SEAL HOUSING GASKET	**11373-00**
			1	EE	BEARING SPACER RING	**11374-00**
△1			1	DD	FIRST STAGE SUN GEAR BEARING	CS10-GU-505-00
			1	CC	BEARING - FIRST STAGE	CS10-GU-507-00
	1			BB	BEARING - SECOND STAGE	CS10-GU-506-00
	9		8	AA	HEX HEAD CAP SCREW	HXCS-31-18X75-8
△1			2	Z	O-RING	CS10-GU-309-00
	3			Y	SECOND STAGE PLANET GEAR	**11099-00**
	3			X	SECOND STAGE JOURNAL BUSHING	**11353-02**
	3			W	SECOND STAGE JOURNAL	**10988-00**
	6			V	SECOND STAGE THRUST WASHER	**11028-00**
△1	1			U	CAGE AND CARRIER - SECOND STAGE	**1329700B**
△2 △1		1		T	BELVILLE WASHER	PP1364
		1		S	KEY - 1/4 X 1/2	**11375-00**
△1		1		R	FIRST STAGE INNER BEARING	CS10-GU-503-00
		8	8	Q	HEX HEAD CAP SCREW	HXCS-25-20X63-8
	6	4		P	DOWEL PIN	PP1365
△1	3	2		O	WAVEY SPRING WASHER	PP1363
		1		N	SECOND STAGE SUN GEAR	**11101-00**
△1			1	M	RETAINING RING	CS10-GU-317-00
		1		L	FIRST STAGE SUN GEAR	**11100-00**
		4		K	FIRST STAGE THRUST WASHER	**10996-00**
		2		J	FIRST STAGE PLANET GEAR	**11098-00**
		2		I	FIRST STAGE JOURNAL BUSHING	**11353-01**
		2		H	FIRST STAGE JOURNAL	**10987-00**
△1		1		G	CAGE AND CARRIER - FIRST STAGE	**1329900B**
			1	F	SEAL HOUSING	**11029-00**
			1	E	SHELL REAR COVER	**10905-00**
			1	D	SHELL FRONT COVER	**10986-00**
			1	C	SHELL	**10995-00**
	X		1	B	COMPLETE STAGE TWO ASSY	
		X	1	A	COMPLETE STAGE ONE ASSY	
			X	01	COMPLETE GEAR UNIT	

REV	CHANGE	CKD	DATE
2	ITEM T QUANTITY WAS 2.	MCR / SDB	1/30/07
1	UPDATED DRAWING NUMBERS.	NVB	4/3/01

TITLE PARTS LIST
DE-1000™ GEAR UNIT 52:1

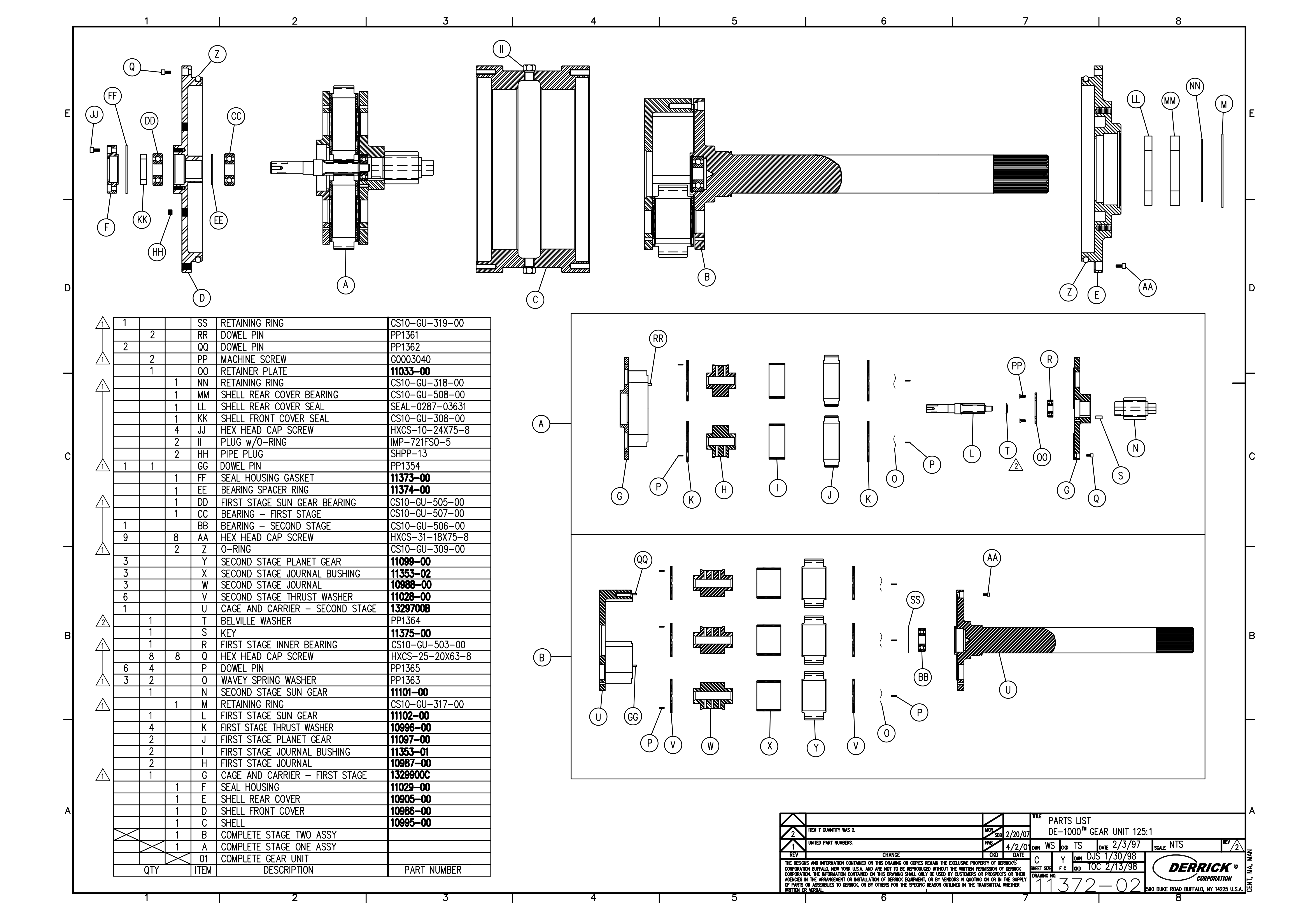
DWN WS | CKD TS | DATE 11/12/93 | SCALE NTS | REV 2

SHEET SIZE C | F C Y | DWN DJS 1/30/98 | CKD TOC 2/13/98

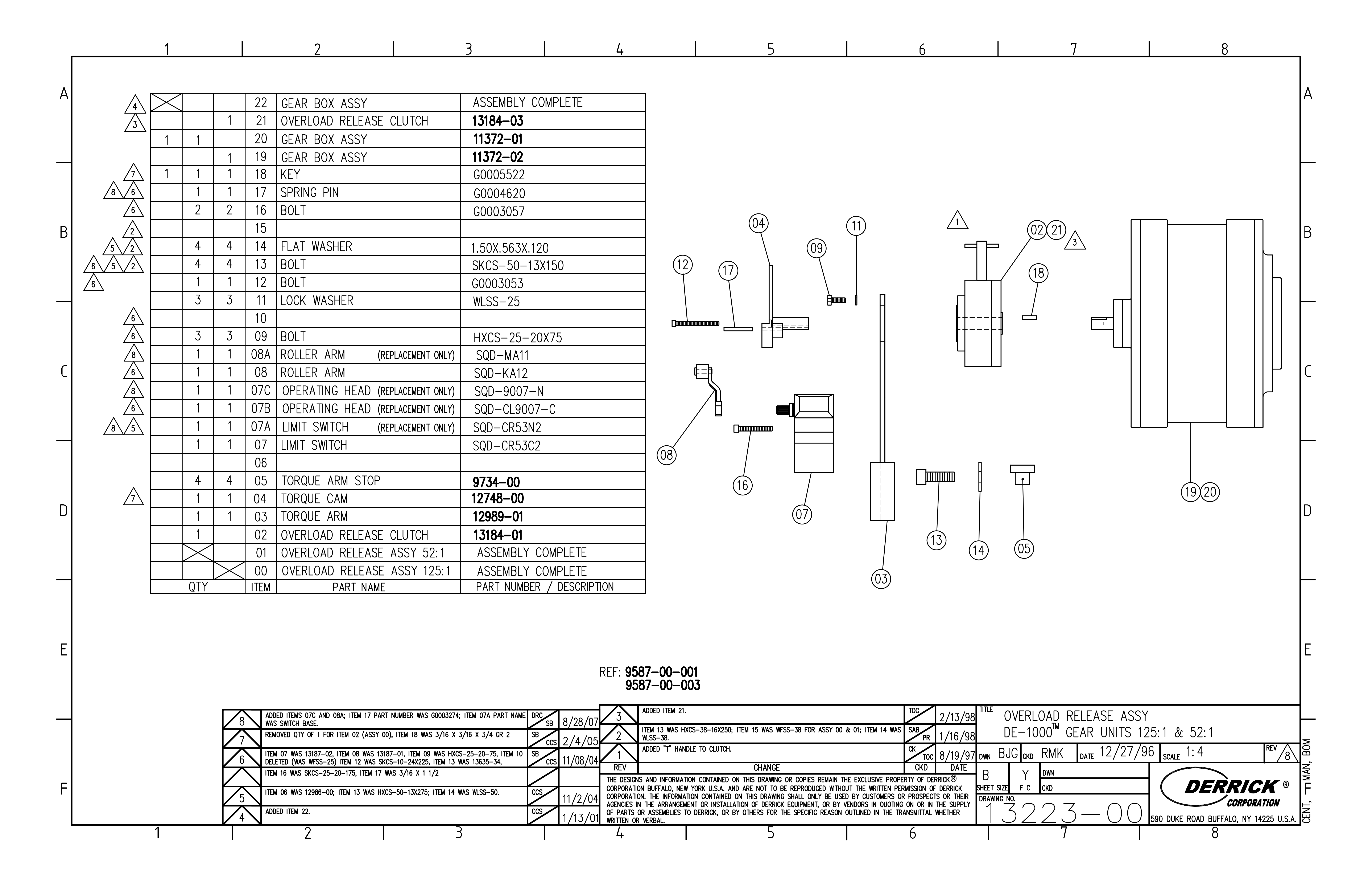
DRAWING NO. 11372-01

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MA, MAN



Rev	QTY	QTY	QTY	ITEM	DESCRIPTION	PART NUMBER
△1	1			SS	RETAINING RING	CS10-GU-319-00
		2		RR	DOWEL PIN	PP1361
	2			QQ	DOWEL PIN	PP1362
△1		2		PP	MACHINE SCREW	G0003040
		1		OO	RETAINER PLATE	11033-00
△1			1	NN	RETAINING RING	CS10-GU-318-00
			1	MM	SHELL REAR COVER BEARING	CS10-GU-508-00
			1	LL	SHELL REAR COVER SEAL	SEAL-0287-03631
			1	KK	SHELL FRONT COVER SEAL	CS10-GU-308-00
			4	JJ	HEX HEAD CAP SCREW	HXCS-10-24X75-8
			2	II	PLUG w/O-RING	IMP-721FSO-5
			2	HH	PIPE PLUG	SHPP-13
△1	1	1		GG	DOWEL PIN	PP1354
			1	FF	SEAL HOUSING GASKET	11373-00
			1	EE	BEARING SPACER RING	11374-00
△1			1	DD	FIRST STAGE SUN GEAR BEARING	CS10-GU-505-00
			1	CC	BEARING - FIRST STAGE	CS10-GU-507-00
	1			BB	BEARING - SECOND STAGE	CS10-GU-506-00
	9		8	AA	HEX HEAD CAP SCREW	HXCS-31-18X75-8
△1			2	Z	O-RING	CS10-GU-309-00
	3			Y	SECOND STAGE PLANET GEAR	11099-00
	3			X	SECOND STAGE JOURNAL BUSHING	11353-02
	3			W	SECOND STAGE JOURNAL	10988-00
	6			V	SECOND STAGE THRUST WASHER	11028-00
	1			U	CAGE AND CARRIER - SECOND STAGE	1329700B
△2		1		T	BELVILLE WASHER	PP1364
		1		S	KEY	11375-00
△1		1		R	FIRST STAGE INNER BEARING	CS10-GU-503-00
		8	8	Q	HEX HEAD CAP SCREW	HXCS-25-20X63-8
	6	4		P	DOWEL PIN	PP1365
△1	3	2		O	WAVEY SPRING WASHER	PP1363
		1		N	SECOND STAGE SUN GEAR	11101-00
△1			1	M	RETAINING RING	CS10-GU-317-00
		1		L	FIRST STAGE SUN GEAR	11102-00
		4		K	FIRST STAGE THRUST WASHER	10996-00
		2		J	FIRST STAGE PLANET GEAR	11097-00
		2		I	FIRST STAGE JOURNAL BUSHING	11353-01
		2		H	FIRST STAGE JOURNAL	10987-00
△1		1		G	CAGE AND CARRIER - FIRST STAGE	1329900C
			1	F	SEAL HOUSING	11029-00
			1	E	SHELL REAR COVER	10905-00
			1	D	SHELL FRONT COVER	10986-00
			1	C	SHELL	10995-00
			1	B	COMPLETE STAGE TWO ASSY	
			1	A	COMPLETE STAGE ONE ASSY	
				01	COMPLETE GEAR UNIT	
	QTY			ITEM	DESCRIPTION	PART NUMBER



REV	QTY			ITEM	PART NAME	PART NUMBER / DESCRIPTION
4				22	GEAR BOX ASSY	ASSEMBLY COMPLETE
3			1	21	OVERLOAD RELEASE CLUTCH	**13184-03**
	1	1		20	GEAR BOX ASSY	**11372-01**
			1	19	GEAR BOX ASSY	**11372-02**
7	1	1	1	18	KEY	G0005522
8, 6		1	1	17	SPRING PIN	G0004620
6		2	2	16	BOLT	G0003057
2				15		
5, 2		4	4	14	FLAT WASHER	1.50X.563X.120
6, 5, 2		4	4	13	BOLT	SKCS-50-13X150
6		1	1	12	BOLT	G0003053
		3	3	11	LOCK WASHER	WLSS-25
6				10		
6		3	3	09	BOLT	HXCS-25-20X75
8		1	1	08A	ROLLER ARM (REPLACEMENT ONLY)	SQD-MA11
6		1	1	08	ROLLER ARM	SQD-KA12
8		1	1	07C	OPERATING HEAD (REPLACEMENT ONLY)	SQD-9007-N
6		1	1	07B	OPERATING HEAD (REPLACEMENT ONLY)	SQD-CL9007-C
8, 5		1	1	07A	LIMIT SWITCH (REPLACEMENT ONLY)	SQD-CR53N2
		1	1	07	LIMIT SWITCH	SQD-CR53C2
				06		
		4	4	05	TORQUE ARM STOP	**9734-00**
7		1	1	04	TORQUE CAM	**12748-00**
		1	1	03	TORQUE ARM	**12989-01**
		1		02	OVERLOAD RELEASE CLUTCH	**13184-01**
				01	OVERLOAD RELEASE ASSY 52:1	ASSEMBLY COMPLETE
				00	OVERLOAD RELEASE ASSY 125:1	ASSEMBLY COMPLETE

REV	CHANGE	CKD	DATE
8	ADDED ITEMS 07C AND 08A; ITEM 17 PART NUMBER WAS G0003274; ITEM 07A PART NAME WAS SWITCH BASE.	DRC / SB	8/28/07
7	REMOVED QTY OF 1 FOR ITEM 02 (ASSY 00), ITEM 18 WAS 3/16 X 3/16 X 3/4 GR 2	SB / CCS	2/4/05
6	ITEM 07 WAS 13187-02, ITEM 08 WAS 13187-01, ITEM 09 WAS HXCS-25-20-75, ITEM 10 DELETED (WAS WFSS-25) ITEM 12 WAS SKCS-10-24X225, ITEM 13 WAS 13635-34, ITEM 16 WAS SKCS-25-20-175, ITEM 17 WAS 3/16 X 1 1/2	SB / CCS	11/08/04
5	ITEM 06 WAS 12986-00; ITEM 13 WAS HXCS-50-13X275; ITEM 14 WAS WLSS-50.	CCS	11/2/04
4	ADDED ITEM 22.	CCS	1/13/01
3	ADDED ITEM 21.	TOC	2/13/98
2	ITEM 13 WAS HXCS-38-16X250; ITEM 15 WAS WFSS-38 FOR ASSY 00 & 01; ITEM 14 WAS WLSS-38.	SAB / PR	1/16/98
1	ADDED "T" HANDLE TO CLUTCH.	CK / TOC	8/19/97

TITLE: OVERLOAD RELEASE ASSY
DE-1000™ GEAR UNITS 125:1 & 52:1

DWN BJG | CKD RMK | DATE 12/27/96 | SCALE 1:4 | REV 8

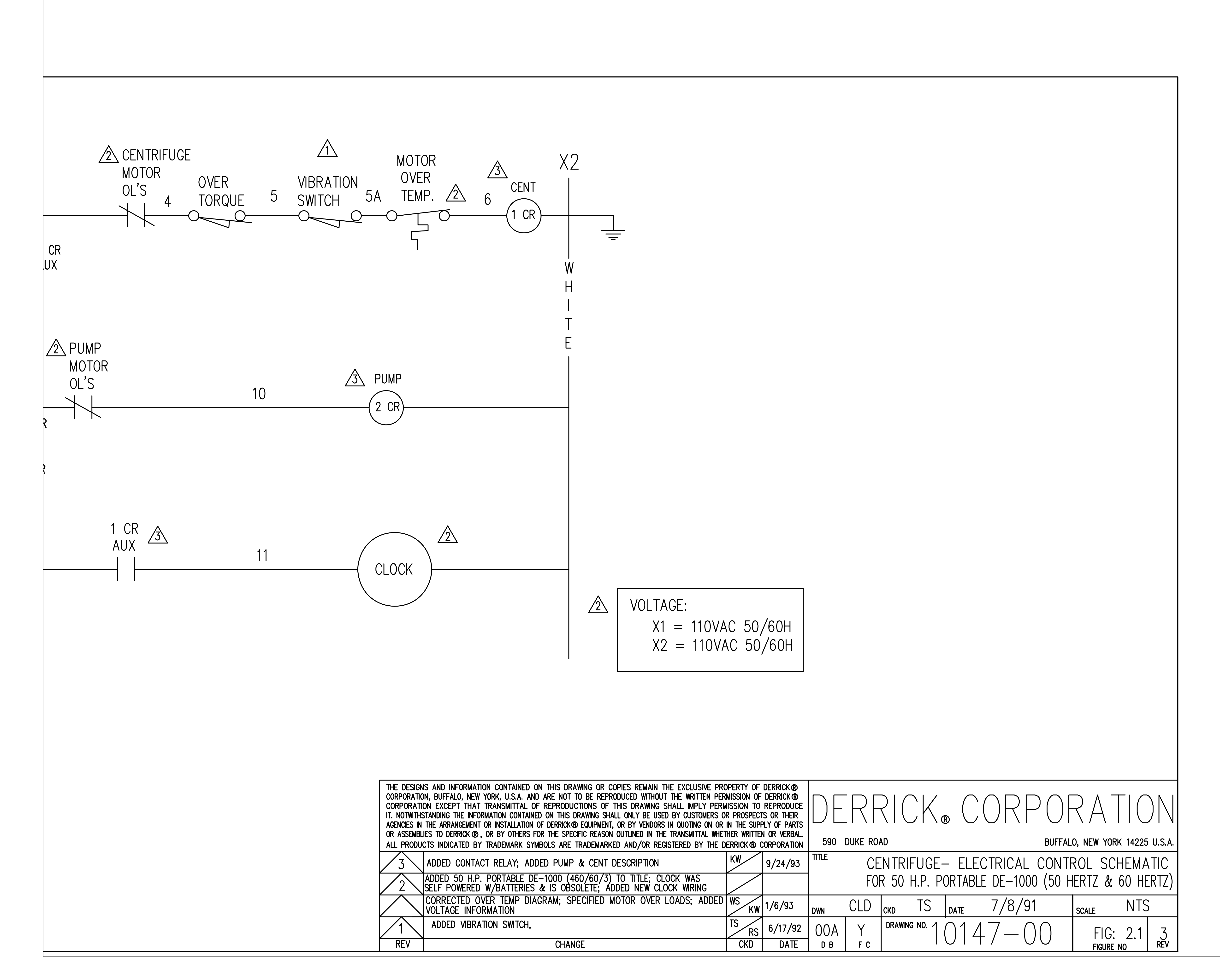
SHEET SIZE B | F C Y | DWN | CKD

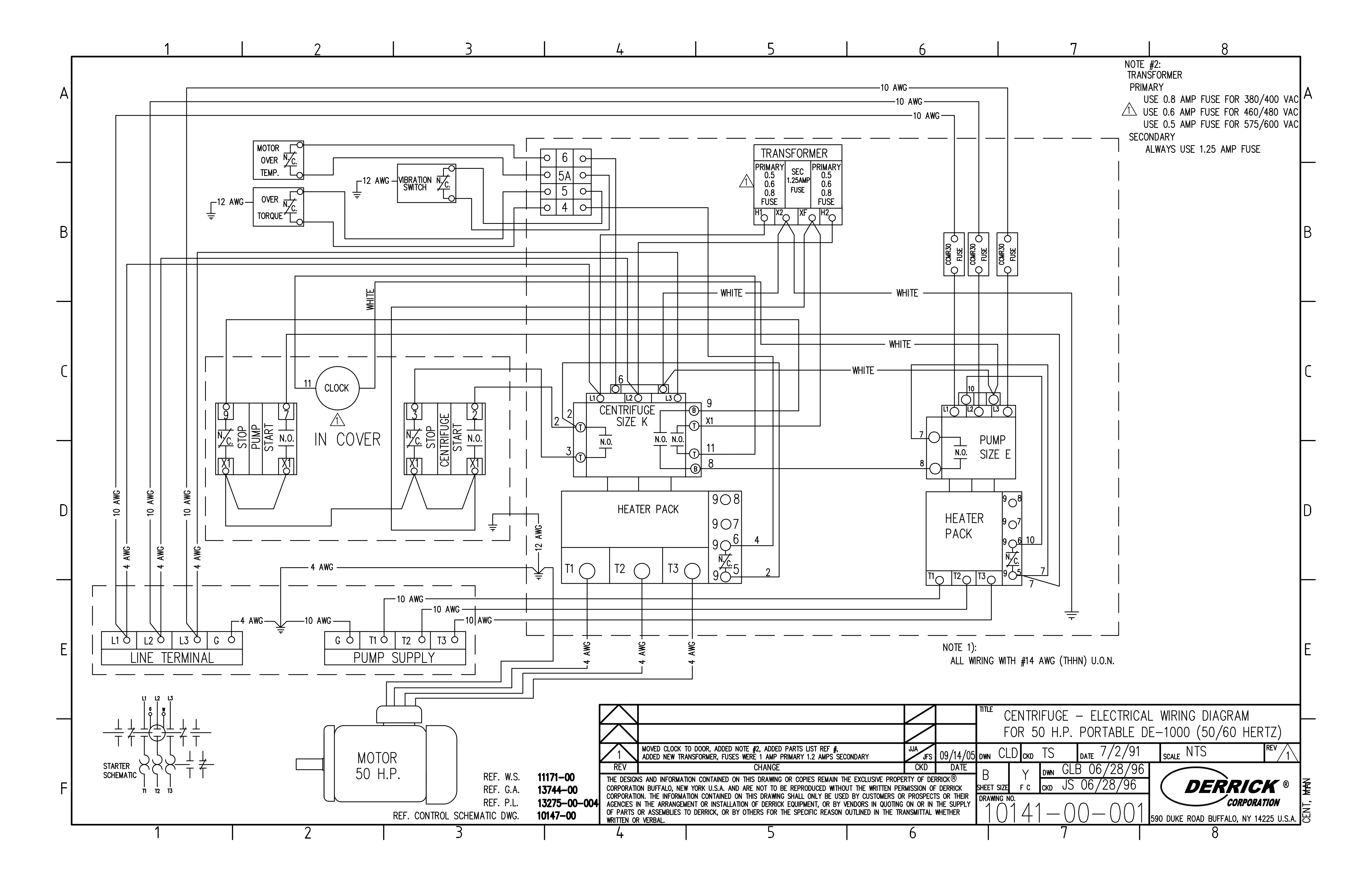
DRAWING NO. 13223-00

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN, BOM

SHEET SIZE = B1





REV	CHANGE	CKD	DATE
1	MOVED CLOCK TO DOOR, ADDED NOTE #2, ADDED PARTS LIST REF #, ADDED NEW TRANSFORMER, FUSES WERE 1 AMP PRIMARY 1.2 AMPS SECONDARY	JJA / JFS	09/14/05

TITLE: CENTRIFUGE – ELECTRICAL WIRING DIAGRAM FOR 50 H.P. PORTABLE DE-1000 (50/60 HERTZ)

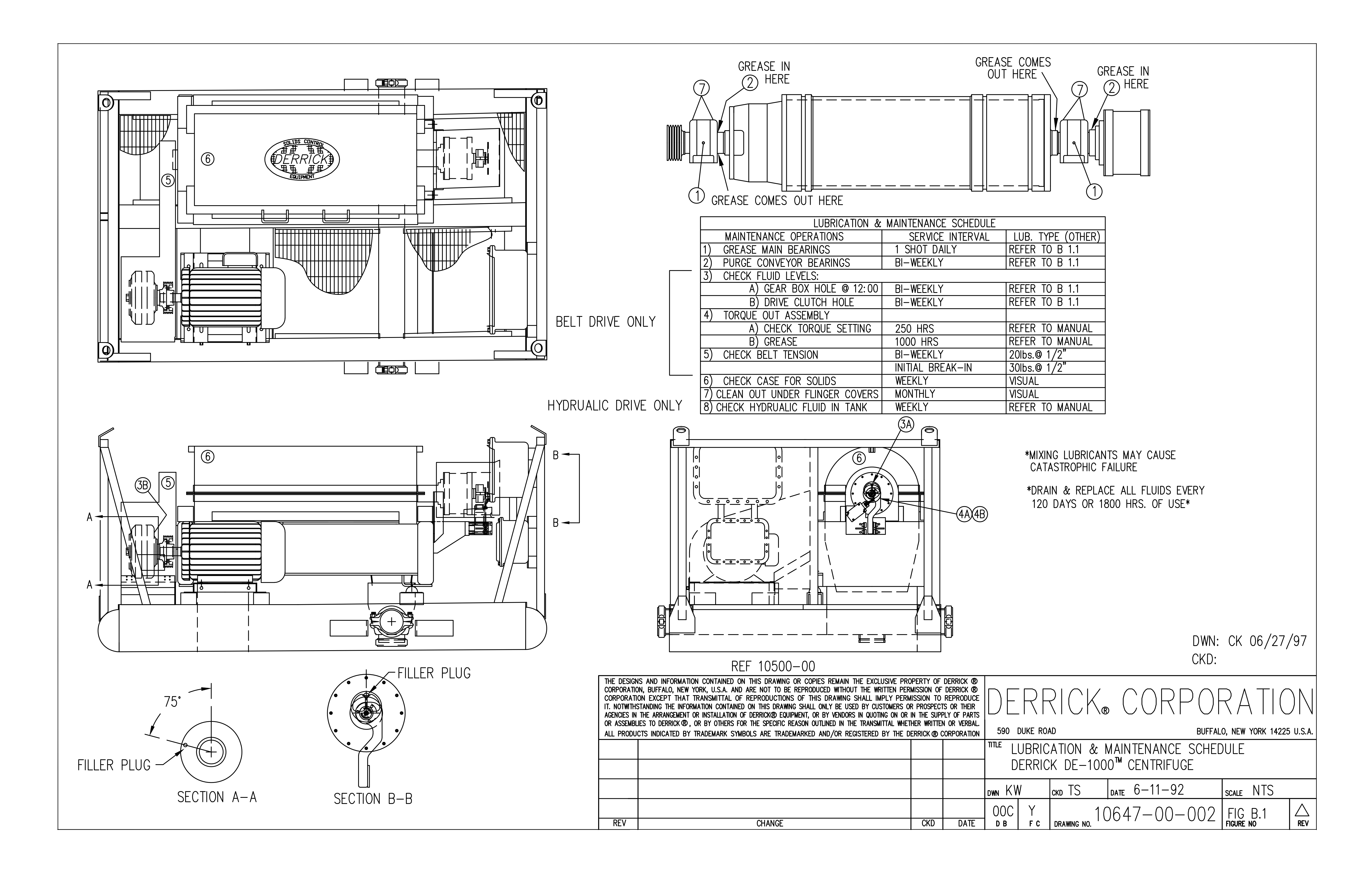
DWN CLD CKD TS DATE 7/2/91 SCALE NTS REV 1

SHEET SIZE B | F C Y | DWN GLB 06/28/96 | CKD JS 06/28/96

DRAWING NO. 10141-00-001

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN



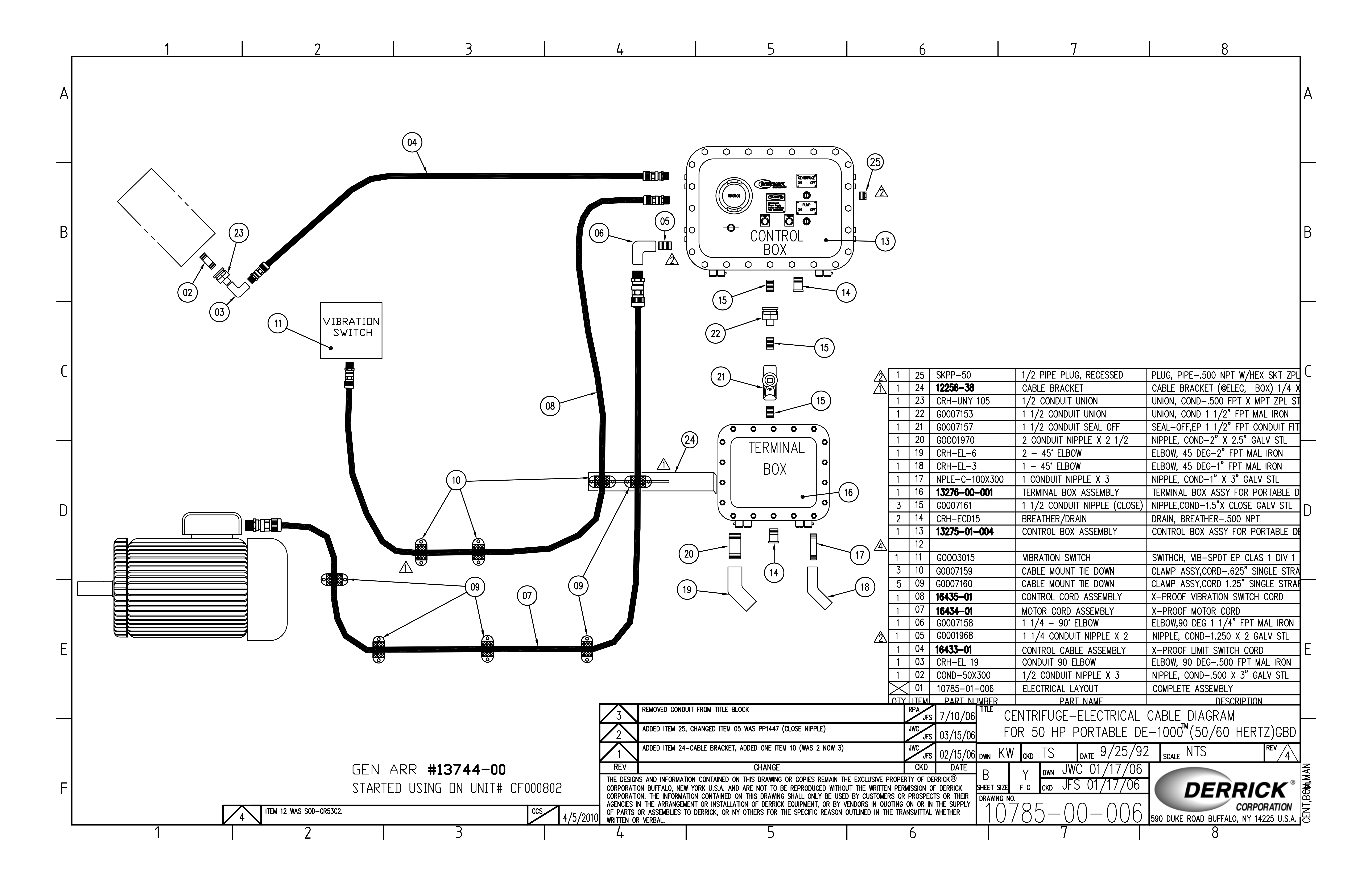
LUBRICATION & MAINTENANCE SCHEDULE		
MAINTENANCE OPERATIONS	SERVICE INTERVAL	LUB. TYPE (OTHER)
1) GREASE MAIN BEARINGS	1 SHOT DAILY	REFER TO B 1.1
2) PURGE CONVEYOR BEARINGS	BI-WEEKLY	REFER TO B 1.1
3) CHECK FLUID LEVELS:		
A) GEAR BOX HOLE @ 12:00	BI-WEEKLY	REFER TO B 1.1
B) DRIVE CLUTCH HOLE	BI-WEEKLY	REFER TO B 1.1
4) TORQUE OUT ASSEMBLY		
A) CHECK TORQUE SETTING	250 HRS	REFER TO MANUAL
B) GREASE	1000 HRS	REFER TO MANUAL
5) CHECK BELT TENSION	BI-WEEKLY	20lbs.@ 1/2"
	INITIAL BREAK-IN	30lbs.@ 1/2"
6) CHECK CASE FOR SOLIDS	WEEKLY	VISUAL
7) CLEAN OUT UNDER FLINGER COVERS	MONTHLY	VISUAL
8) CHECK HYDRUALIC FLUID IN TANK	WEEKLY	REFER TO MANUAL

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NEW YORK 14225 U.S.A.

TITLE LUBRICATION & MAINTENANCE SCHEDULE
DERRICK DE-1000™ CENTRIFUGE

DWN KW | CKD TS | DATE 6-11-92 | SCALE NTS
00C DB | Y FC | DRAWING NO. 10647-00-002 | FIG B.1 FIGURE NO | REV

REV	CHANGE	CKD	DATE



QTY	ITEM	PART NUMBER	PART NAME	DESCRIPTION
1	25	SKPP-50	1/2 PIPE PLUG, RECESSED	PLUG, PIPE-.500 NPT W/HEX SKT ZPL
1	24	**12256-38**	CABLE BRACKET	CABLE BRACKET (@ELEC, BOX) 1/4 X
1	23	CRH-UNY 105	1/2 CONDUIT UNION	UNION, COND-.500 FPT X MPT ZPL ST
1	22	G0007153	1 1/2 CONDUIT UNION	UNION, COND 1 1/2" FPT MAL IRON
1	21	G0007157	1 1/2 CONDUIT SEAL OFF	SEAL-OFF,EP 1 1/2" FPT CONDUIT FIT
1	20	G0001970	2 CONDUIT NIPPLE X 2 1/2	NIPPLE, COND-2" X 2.5" GALV STL
1	19	CRH-EL-6	2 - 45° ELBOW	ELBOW, 45 DEG-2" FPT MAL IRON
1	18	CRH-EL-3	1 - 45° ELBOW	ELBOW, 45 DEG-1" FPT MAL IRON
1	17	NPLE-C-100X300	1 CONDUIT NIPPLE X 3	NIPPLE, COND-1" X 3" GALV STL
1	16	**13276-00-001**	TERMINAL BOX ASSEMBLY	TERMINAL BOX ASSY FOR PORTABLE D
3	15	G0007161	1 1/2 CONDUIT NIPPLE (CLOSE)	NIPPLE,COND-1.5"X CLOSE GALV STL
2	14	CRH-ECD15	BREATHER/DRAIN	DRAIN, BREATHER-.500 NPT
1	13	**13275-01-004**	CONTROL BOX ASSEMBLY	CONTROL BOX ASSY FOR PORTABLE DE
	12			
1	11	G0003015	VIBRATION SWITCH	SWITHCH, VIB-SPDT EP CLAS 1 DIV 1
3	10	G0007159	CABLE MOUNT TIE DOWN	CLAMP ASSY,CORD-.625" SINGLE STRA
5	09	G0007160	CABLE MOUNT TIE DOWN	CLAMP ASSY,CORD 1.25" SINGLE STRAP
1	08	**16435-01**	CONTROL CORD ASSEMBLY	X-PROOF VIBRATION SWITCH CORD
1	07	**16434-01**	MOTOR CORD ASSEMBLY	X-PROOF MOTOR CORD
1	06	G0007158	1 1/4 - 90° ELBOW	ELBOW,90 DEG 1 1/4" FPT MAL IRON
1	05	G0001968	1 1/4 CONDUIT NIPPLE X 2	NIPPLE, COND-1.250 X 2 GALV STL
1	04	**16433-01**	CONTROL CABLE ASSEMBLY	X-PROOF LIMIT SWITCH CORD
1	03	CRH-EL 19	CONDUIT 90 ELBOW	ELBOW, 90 DEG-.500 FPT MAL IRON
1	02	COND-50X300	1/2 CONDUIT NIPPLE X 3	NIPPLE, COND-.500 X 3" GALV STL
	01	10785-01-006	ELECTRICAL LAYOUT	COMPLETE ASSEMBLY

REV	CHANGE	CKD	DATE
4	ITEM 12 WAS SQD-CR53C2.	CCS	4/5/2010
3	REMOVED CONDUIT FROM TITLE BLOCK	RPA / JFS	7/10/06
2	ADDED ITEM 25, CHANGED ITEM 05 WAS PP1447 (CLOSE NIPPLE)	JWC / JFS	03/15/06
1	ADDED ITEM 24-CABLE BRACKET, ADDED ONE ITEM 10 (WAS 2 NOW 3)	JWC / JFS	02/15/06

TITLE: CENTRIFUGE-ELECTRICAL CABLE DIAGRAM FOR 50 HP PORTABLE DE-1000™(50/60 HERTZ)GBD

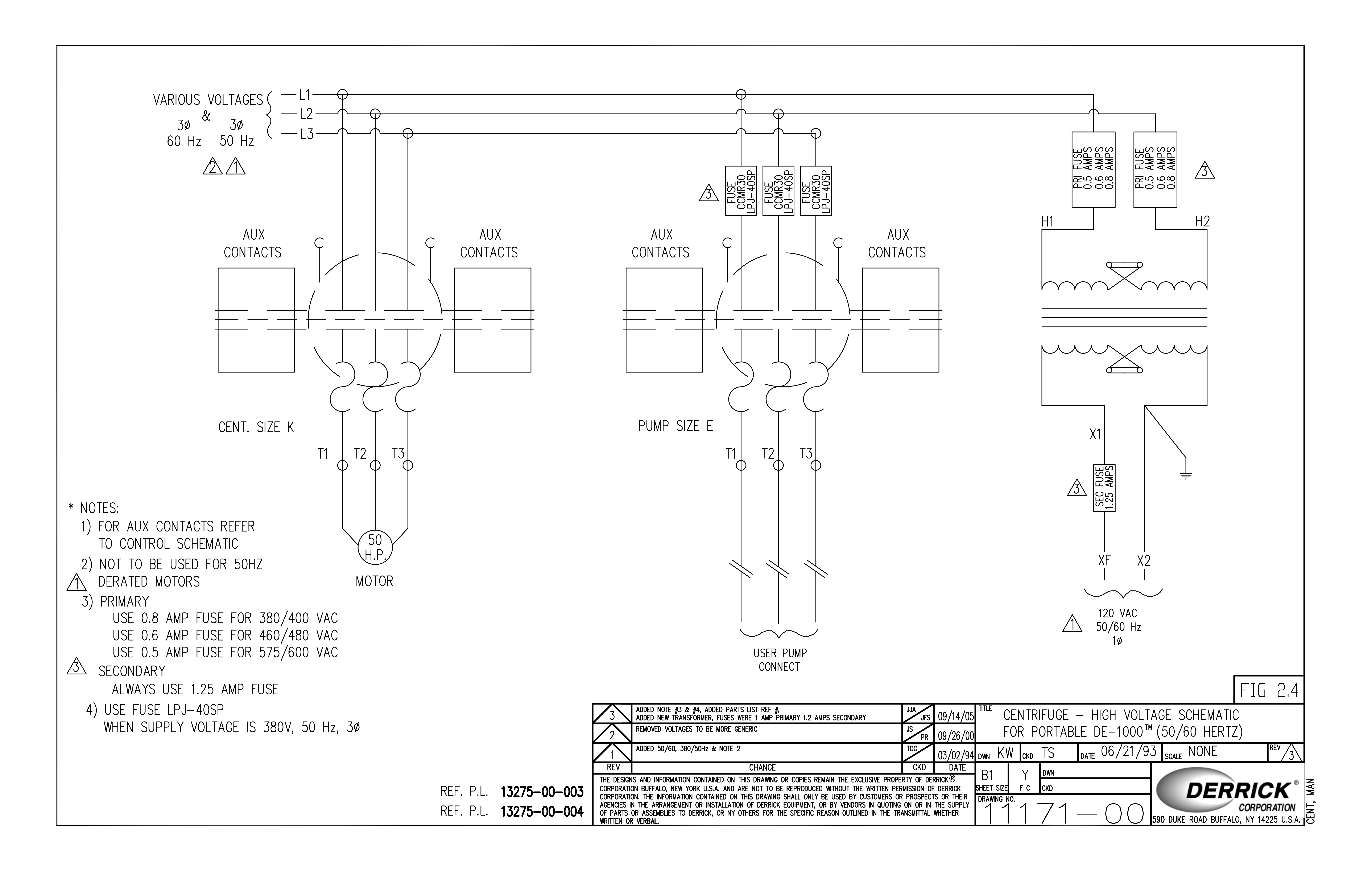
DWN KW | CKD TS | DATE 9/25/92 | SCALE NTS | REV 4

SHEET SIZE B | F C Y | DWN JWC 01/17/06 | CKD JFS 01/17/06

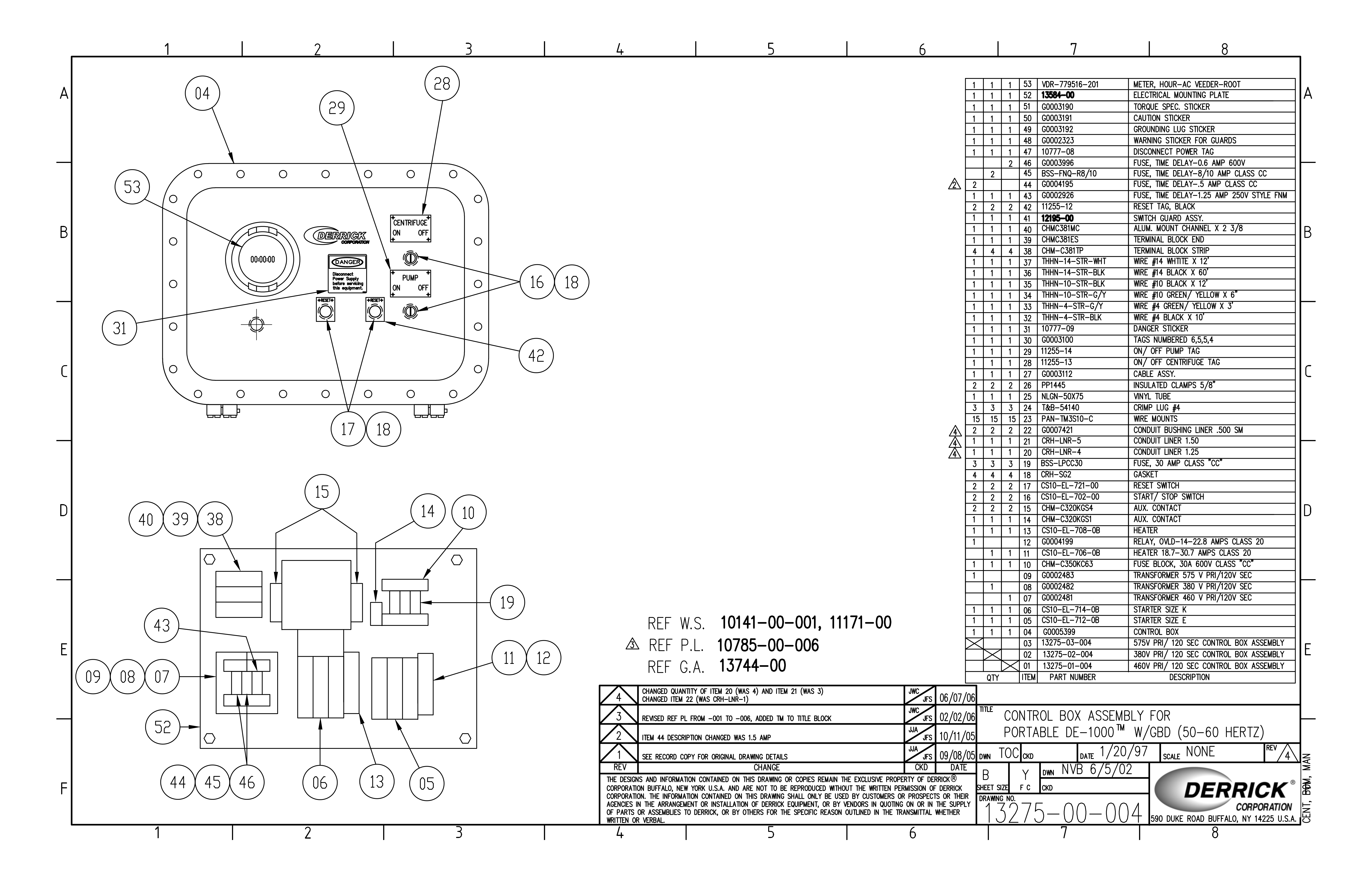
DRAWING NO. 10785-00-006

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT,BOM,MAN

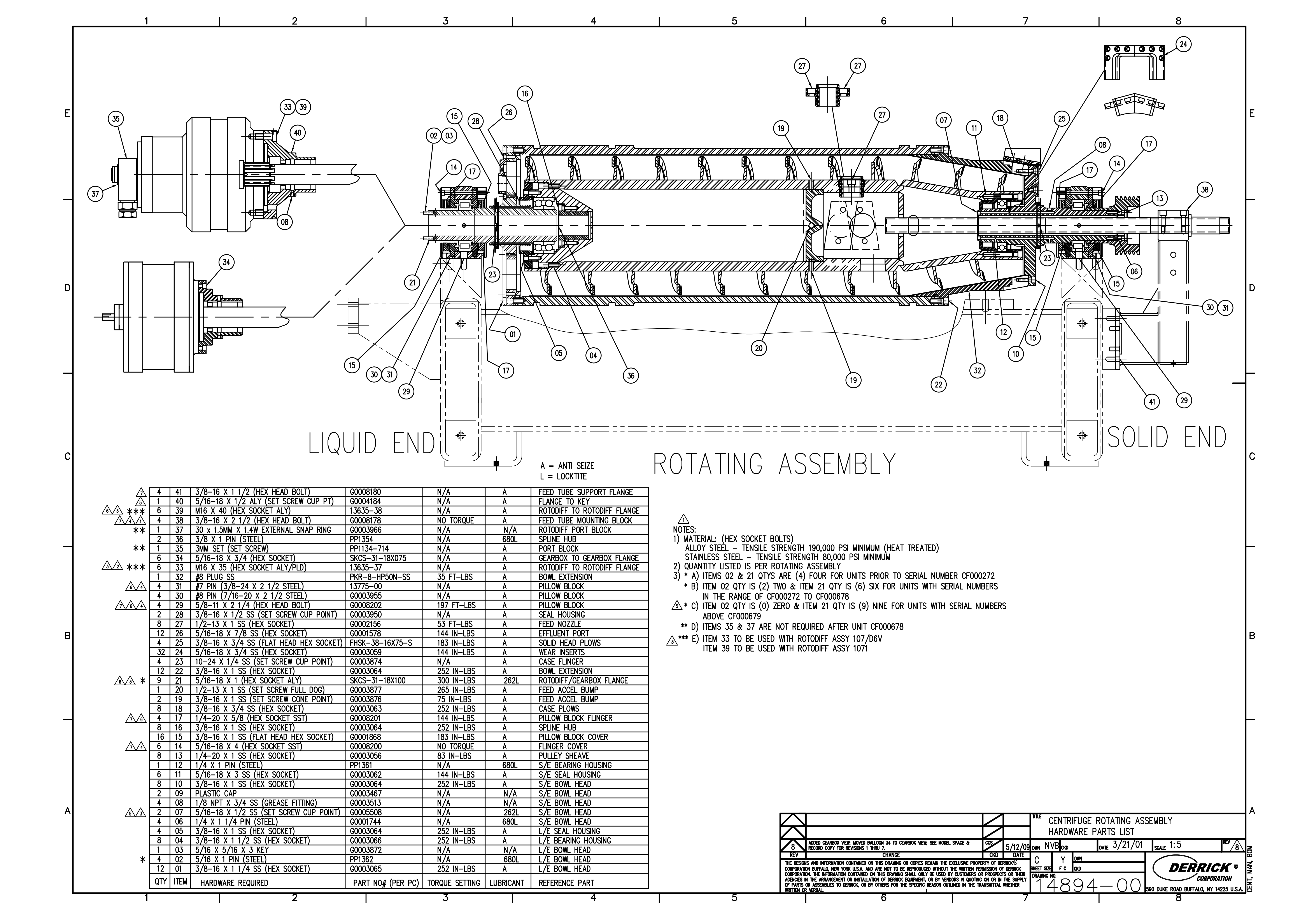


VARIOUS VOLTAGES
3ø & 3ø
60 Hz 50 Hz
L1
L2
L3
FUSE CCMR30 LPJ-40SP
PRI FUSE 0.5 AMPS 0.6 AMPS 0.8 AMPS
H1
H2
AUX CONTACTS
CENT. SIZE K
PUMP SIZE E
T1
T2
T3
X1
SEC FUSE 1.25 AMPS
XF
X2
50 H.P.
MOTOR
120 VAC 50/60 Hz 1ø
USER PUMP CONNECT
* NOTES:
1) FOR AUX CONTACTS REFER TO CONTROL SCHEMATIC
2) NOT TO BE USED FOR 50HZ DERATED MOTORS
3) PRIMARY
USE 0.8 AMP FUSE FOR 380/400 VAC
USE 0.6 AMP FUSE FOR 460/480 VAC
USE 0.5 AMP FUSE FOR 575/600 VAC
SECONDARY
ALWAYS USE 1.25 AMP FUSE
4) USE FUSE LPJ-40SP
WHEN SUPPLY VOLTAGE IS 380V, 50 Hz, 3ø
FIG 2.4
REF. P.L. 13275-00-003
REF. P.L. 13275-00-004
3 ADDED NOTE #3 & #4, ADDED PARTS LIST REF #, ADDED NEW TRANSFORMER, FUSES WERE 1 AMP PRIMARY 1.2 AMPS SECONDARY JJA JFS 09/14/05
2 REMOVED VOLTAGES TO BE MORE GENERIC JS PR 09/26/00
1 ADDED 50/60, 380/50Hz & NOTE 2 TOC 03/02/94
REV CHANGE CKD DATE
TITLE CENTRIFUGE – HIGH VOLTAGE SCHEMATIC FOR PORTABLE DE-1000™ (50/60 HERTZ)
DWN KW CKD TS DATE 06/21/93 SCALE NONE REV 3
B1 SHEET SIZE Y F C DWN CKD
DRAWING NO. 11171-00
DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.
CENT, MAN
THE DESIGNS AND INFORMATION CONTAINED ON THIS DRAWING OR COPIES REMAIN THE EXCLUSIVE PROPERTY OF DERRICK® CORPORATION BUFFALO, NEW YORK U.S.A. AND ARE NOT TO BE REPRODUCED WITHOUT THE WRITTEN PERMISSION OF DERRICK CORPORATION. THE INFORMATION CONTAINED ON THIS DRAWING SHALL ONLY BE USED BY CUSTOMERS OR PROSPECTS OR THEIR AGENCIES IN THE ARRANGEMENT OR INSTALLATION OF DERRICK EQUIPMENT, OR BY VENDORS IN QUOTING ON OR IN THE SUPPLY OF PARTS OR ASSEMBLIES TO DERRICK, OR NY OTHERS FOR THE SPECIFIC REASON OUTLINED IN THE TRANSMITTAL WHETHER WRITTEN OR VERBAL.



	QTY			ITEM	PART NUMBER	DESCRIPTION
	1	1	1	53	VDR-779516-201	METER, HOUR-AC VEEDER-ROOT
	1	1	1	52	**13584-00**	ELECTRICAL MOUNTING PLATE
	1	1	1	51	G0003190	TORQUE SPEC. STICKER
	1	1	1	50	G0003191	CAUTION STICKER
	1	1	1	49	G0003192	GROUNDING LUG STICKER
	1	1	1	48	G0002323	WARNING STICKER FOR GUARDS
	1	1	1	47	10777-08	DISCONNECT POWER TAG
			2	46	G0003996	FUSE, TIME DELAY-0.6 AMP 600V
		2		45	BSS-FNQ-R8/10	FUSE, TIME DELAY-8/10 AMP CLASS CC
2	2			44	G0004195	FUSE, TIME DELAY-.5 AMP CLASS CC
	1	1	1	43	G0002926	FUSE, TIME DELAY-1.25 AMP 250V STYLE FNM
	2	2	2	42	11255-12	RESET TAG, BLACK
	1	1	1	41	**12195-00**	SWITCH GUARD ASSY.
	1	1	1	40	CHMC381MC	ALUM. MOUNT CHANNEL X 2 3/8
	1	1	1	39	CHMC381ES	TERMINAL BLOCK END
	4	4	4	38	CHM-C381TP	TERMINAL BLOCK STRIP
	1	1	1	37	THHN-14-STR-WHT	WIRE #14 WHTITE X 12'
	1	1	1	36	THHN-14-STR-BLK	WIRE #14 BLACK X 60'
	1	1	1	35	THHN-10-STR-BLK	WIRE #10 BLACK X 12'
	1	1	1	34	THHN-10-STR-G/Y	WIRE #10 GREEN/ YELLOW X 6"
	1	1	1	33	THHN-4-STR-G/Y	WIRE #4 GREEN/ YELLOW X 3'
	1	1	1	32	THHN-4-STR-BLK	WIRE #4 BLACK X 10'
	1	1	1	31	10777-09	DANGER STICKER
	1	1	1	30	G0003100	TAGS NUMBERED 6,5,5,4
	1	1	1	29	11255-14	ON/ OFF PUMP TAG
	1	1	1	28	11255-13	ON/ OFF CENTRIFUGE TAG
	1	1	1	27	G0003112	CABLE ASSY.
	2	2	2	26	PP1445	INSULATED CLAMPS 5/8"
	1	1	1	25	NLGN-50X75	VINYL TUBE
	3	3	3	24	T&B-54140	CRIMP LUG #4
	15	15	15	23	PAN-TM3S10-C	WIRE MOUNTS
4	2	2	2	22	G0007421	CONDUIT BUSHING LINER .500 SM
4	1	1	1	21	CRH-LNR-5	CONDUIT LINER 1.50
4	1	1	1	20	CRH-LNR-4	CONDUIT LINER 1.25
	3	3	3	19	BSS-LPCC30	FUSE, 30 AMP CLASS "CC"
	4	4	4	18	CRH-SG2	GASKET
	2	2	2	17	CS10-EL-721-00	RESET SWITCH
	2	2	2	16	CS10-EL-702-00	START/ STOP SWITCH
	2	2	2	15	CHM-C320KGS4	AUX. CONTACT
	1	1	1	14	CHM-C320KGS1	AUX. CONTACT
	1	1	1	13	CS10-EL-708-0B	HEATER
	1			12	G0004199	RELAY, OVLD-14-22.8 AMPS CLASS 20
		1	1	11	CS10-EL-706-0B	HEATER 18.7-30.7 AMPS CLASS 20
	1	1	1	10	CHM-C350KC63	FUSE BLOCK, 30A 600V CLASS "CC"
	1			09	G0002483	TRANSFORMER 575 V PRI/120V SEC
		1		08	G0002482	TRANSFORMER 380 V PRI/120V SEC
			1	07	G0002481	TRANSFORMER 460 V PRI/120V SEC
	1	1	1	06	CS10-EL-714-0B	STARTER SIZE K
	1	1	1	05	CS10-EL-712-0B	STARTER SIZE E
	1	1	1	04	G0005399	CONTROL BOX
	X			03	13275-03-004	575V PRI/ 120 SEC CONTROL BOX ASSEMBLY
		X		02	13275-02-004	380V PRI/ 120 SEC CONTROL BOX ASSEMBLY
			X	01	13275-01-004	460V PRI/ 120 SEC CONTROL BOX ASSEMBLY

REV	CHANGE	CKD	DATE
4	CHANGED QUANTITY OF ITEM 20 (WAS 4) AND ITEM 21 (WAS 3) CHANGED ITEM 22 (WAS CRH-LNR-1)	JWC / JFS	06/07/06
3	REVISED REF PL FROM -001 TO -006, ADDED TM TO TITLE BLOCK	JWC / JFS	02/02/06
2	ITEM 44 DESCRIPTION CHANGED WAS 1.5 AMP	JJA / JFS	10/11/05
1	SEE RECORD COPY FOR ORIGINAL DRAWING DETAILS	JJA / JFS	09/08/05



REV	QTY	ITEM	HARDWARE REQUIRED	PART NO# (PER PC)	TORQUE SETTING	LUBRICANT	REFERENCE PART
△7	4	41	3/8-16 X 1 1/2 (HEX HEAD BOLT)	G0008180	N/A	A	FEED TUBE SUPPORT FLANGE
△5	1	40	5/16-18 X 1/2 ALY (SET SCREW CUP PT)	G0004184	N/A	A	FLANGE TO KEY
△6△3 ***	6	39	M16 X 40 (HEX SOCKET ALY)	13635-38	N/A	A	ROTODIFF TO ROTODIFF FLANGE
△7△4△1	4	38	3/8-16 X 2 1/2 (HEX HEAD BOLT)	G0008178	NO TORQUE	A	FEED TUBE MOUNTING BLOCK
**	1	37	30 x 1.5MM X 1.4W EXTERNAL SNAP RING	G0003966	N/A	N/A	ROTODIFF PORT BLOCK
	2	36	3/8 X 1 PIN (STEEL)	PP1354	N/A	680L	SPLINE HUB
**	1	35	3MM SET (SET SCREW)	PP1134-714	N/A	A	PORT BLOCK
	6	34	5/16-18 X 3/4 (HEX SOCKET)	SKCS-31-18X075	N/A	A	GEARBOX TO GEARBOX FLANGE
△3△2 ***	6	33	M16 X 35 (HEX SOCKET ALY/PLD)	13635-37	N/A	A	ROTODIFF TO ROTODIFF FLANGE
	1	32	#8 PLUG SS	PKR-8-HP50N-SS	35 FT-LBS	A	BOWL EXTENSION
△6△4	4	31	#7 PIN (3/8-24 X 2 1/2 STEEL)	13775-00	N/A	A	PILLOW BLOCK
	4	30	#8 PIN (7/16-20 X 2 1/2 STEEL)	G0003955	N/A	A	PILLOW BLOCK
△7△6△4	4	29	5/8-11 X 2 1/4 (HEX HEAD BOLT)	G0008202	197 FT-LBS	A	PILLOW BLOCK
	2	28	3/8-16 X 1/2 SS (SET SCREW CUP POINT)	G0003950	N/A	A	SEAL HOUSING
	8	27	1/2-13 X 1 SS (HEX SOCKET)	G0002156	53 FT-LBS	A	FEED NOZZLE
	12	26	5/16-18 X 7/8 SS (HEX SOCKET)	G0001578	144 IN-LBS	A	EFFLUENT PORT
	4	25	3/8-16 X 3/4 SS (FLAT HEAD HEX SOCKET)	FHSK-38-16X75-S	183 IN-LBS	A	SOLID HEAD PLOWS
	32	24	5/16-18 X 3/4 SS (HEX SOCKET)	G0003059	144 IN-LBS	A	WEAR INSERTS
	4	23	10-24 X 1/4 SS (SET SCREW CUP POINT)	G0003874	N/A	A	CASE FLINGER
	12	22	3/8-16 X 1 SS (HEX SOCKET)	G0003064	252 IN-LBS	A	BOWL EXTENSION
△6△3 *	9	21	5/16-18 X 1 (HEX SOCKET ALY)	SKCS-31-18X100	300 IN-LBS	262L	ROTODIFF/GEARBOX FLANGE
	1	20	1/2-13 X 1 SS (SET SCREW FULL DOG)	G0003877	265 IN-LBS	A	FEED ACCEL BUMP
	2	19	3/8-16 X 1 SS (SET SCREW CONE POINT)	G0003876	75 IN-LBS	A	FEED ACCEL BUMP
	8	18	3/8-16 X 3/4 SS (HEX SOCKET)	G0003063	252 IN-LBS	A	CASE PLOWS
△7△6	4	17	1/4-20 X 5/8 (HEX SOCKET SST)	G0008201	144 IN-LBS	A	PILLOW BLOCK FLINGER
	8	16	3/8-16 X 1 SS (HEX SOCKET)	G0003064	252 IN-LBS	A	SPLINE HUB
	16	15	3/8-16 X 1 SS (FLAT HEAD HEX SOCKET)	G0001868	183 IN-LBS	A	PILLOW BLOCK COVER
△7△4	6	14	5/16-18 X 4 (HEX SOCKET SST)	G0008200	NO TORQUE	A	FLINGER COVER
	8	13	1/4-20 X 1 SS (HEX SOCKET)	G0003056	83 IN-LBS	A	PULLEY SHEAVE
	1	12	1/4 X 1 PIN (STEEL)	PP1361	N/A	680L	S/E BEARING HOUSING
	6	11	5/16-18 X 3 SS (HEX SOCKET)	G0003062	144 IN-LBS	A	S/E SEAL HOUSING
	8	10	3/8-16 X 1 SS (HEX SOCKET)	G0003064	252 IN-LBS	A	S/E BOWL HEAD
	2	09	PLASTIC CAP	G0003467	N/A	N/A	S/E BOWL HEAD
	4	08	1/8 NPT X 3/4 SS (GREASE FITTING)	G0003513	N/A	N/A	S/E BOWL HEAD
△5△3	2	07	5/16-18 X 1/2 SS (SET SCREW CUP POINT)	G0005508	N/A	262L	S/E BOWL HEAD
	4	06	1/4 X 1 1/4 PIN (STEEL)	G0001744	N/A	680L	S/E BOWL HEAD
	4	05	3/8-16 X 1 SS (HEX SOCKET)	G0003064	252 IN-LBS	A	L/E SEAL HOUSING
	8	04	3/8-16 X 1 1/2 SS (HEX SOCKET)	G0003066	252 IN-LBS	A	L/E BEARING HOUSING
	1	03	5/16 X 5/16 X 3 KEY	G0003872	N/A	N/A	L/E BOWL HEAD
*	4	02	5/16 X 1 PIN (STEEL)	PP1362	N/A	680L	L/E BOWL HEAD
	12	01	3/8-16 X 1 1/4 SS (HEX SOCKET)	G0003065	252 IN-LBS	A	L/E BOWL HEAD

△1
NOTES:
1) MATERIAL: (HEX SOCKET BOLTS)
   ALLOY STEEL – TENSILE STRENGTH 190,000 PSI MINIMUM (HEAT TREATED)
   STAINLESS STEEL – TENSILE STRENGTH 80,000 PSI MINIMUM
2) QUANTITY LISTED IS PER ROTATING ASSEMBLY
3) * A) ITEMS 02 & 21 QTYS ARE (4) FOUR FOR UNITS PRIOR TO SERIAL NUMBER CF000272
   * B) ITEM 02 QTY IS (2) TWO & ITEM 21 QTY IS (6) SIX FOR UNITS WITH SERIAL NUMBERS IN THE RANGE OF CF000272 TO CF000678
△5 * C) ITEM 02 QTY IS (0) ZERO & ITEM 21 QTY IS (9) NINE FOR UNITS WITH SERIAL NUMBERS ABOVE CF000679
   ** D) ITEMS 35 & 37 ARE NOT REQUIRED AFTER UNIT CF000678
△3 *** E) ITEM 33 TO BE USED WITH ROTODIFF ASSY 107/D6V
   ITEM 39 TO BE USED WITH ROTODIFF ASSY 1071

REV	CHANGE	CKD	DATE
8	ADDED GEARBOX VIEW; MOVED BALLOON 34 TO GEARBOX VIEW; SEE MODEL SPACE & RECORD COPY FOR REVISIONS 1 THRU 7.	CCS	5/12/09

TITLE: CENTRIFUGE ROTATING ASSEMBLY HARDWARE PARTS LIST
DWN NVB — DATE 3/21/01 — SCALE 1:5 — REV 8
SHEET SIZE C — Y F C
DRAWING NO. 14894-00

DERRICK® CORPORATION
590 DUKE ROAD BUFFALO, NY 14225 U.S.A.

CENT, MAN, BOM



第 9 章：安装和维护记录

目的

本章由操作人员和维护人员用来记录在 Derrick 设备安装和运行期间所收集到的历史信息。如果保管妥善，该记录将有助于改进维护周期和提示需要修改操作步骤的截距趋势。每次填写记录都应当注明日期，以备日后参考和查找。如果需要，可以多复印空白页并插入本章后面来增加记录页数。

安装与维护记录:



第 10 章：供货商资料

概述

本章包括离心机安装部件的制造商手册、专刊、指导和其它技术数据。Derrick 设备总成的图纸、部件清单和电气图请参见第 8 章内容。

电气元件		
元件	描述	资料
Baldor 电动机，型号为 M7064T-I	配置图	*12LYS077*
	连接图	*CD1080*
	性能数据和技术规格	*无编号*
Murphy 冲击/振动开关，型号为 VS2EX	安装指导	*VS-7037N*

机构部件		
部件	描述	资料
Boston 齿轮过载安全离合器	安装和维护指导	*ORC S 系列*
Kraft Transfluid 液力偶合器	安装和维护指导	*0603-148US*

12LYS077

(1232–1272)
32.00
5.44
5.25
.50 KEY
3.88 LONG
2.125
2.124
METAL SLINGER
8 HOLES
ø.66
10.50
10.50
1.00
12.00
5.25
14.00

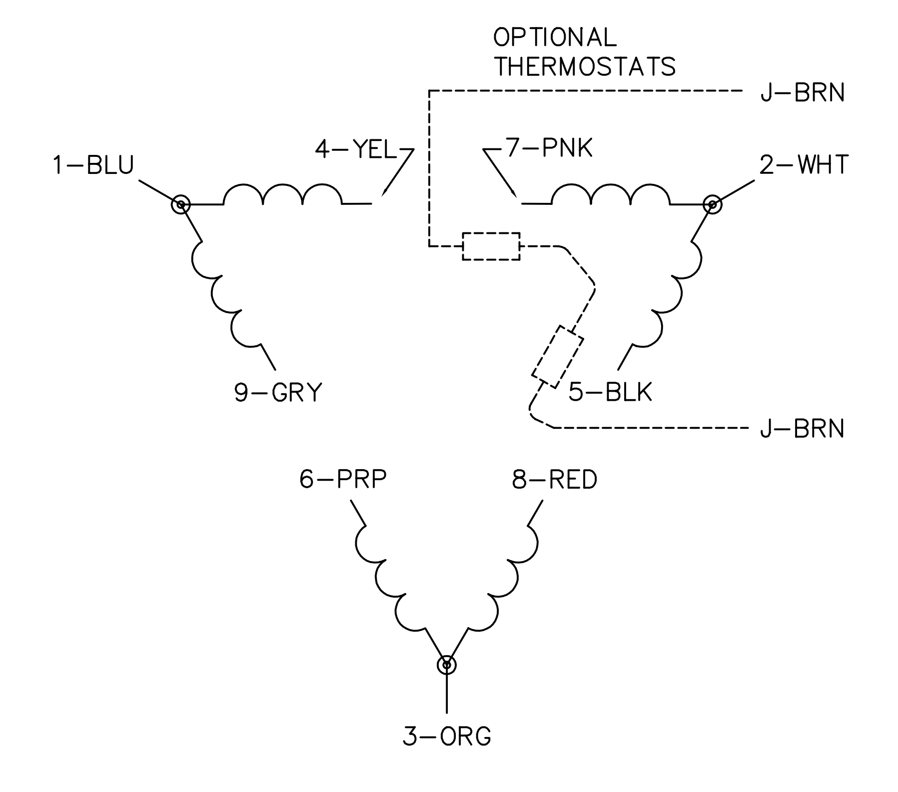
17.40
17.57
8.69
3.22
PIPE PLUGS
(EA. END)
45°
45°
16.68
8.00 +.00 −.06
LEAD HOLE
2.00 N.P.T.
6.25
6.25
12.48
7.25
14.50
DRAIN FITTING
HW4505A02
(EA. END)
1 PIN
HW3023E06
(EA. END)

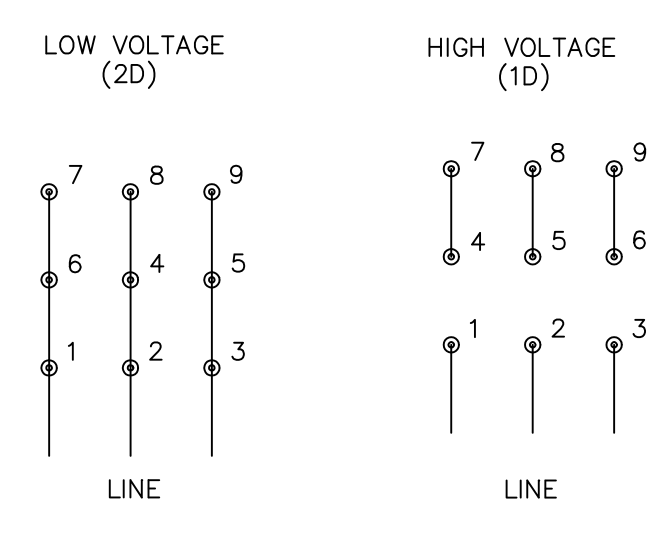
CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT MOTOR PERFORMANCE IS SUITABLE IN THE APPLICATION.

REV. DESC: CHG'D TO NEW DRAIN DESIGN				BALDOR ELECTRIC Co.
REV. LTR: B	BY: RAR	REVISED: 09:17:38 01/18/2002	TDR: 260522	
FILE: AAA00072693			REF: 12LYS077	HORZ XPFC 324–6U & T CLI GP C&D, DRILL RIG
MTL: –				

12LYS077

CD0180





NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

REV. DESC: REVISE TO SHOW OPTIONAL COLORS				BALDOR ELECTRIC Co.
REV. LTR: C	BY: JLP	REVISED: 01/21/99 2:28	TDR: 0171435	
CD0180		FILE: AAA00005148	MDL: –	3PH, DV, 9 LEADS, DELTA CONNECTION
		MTL: –		

CD0180

Performance Data: CL5001A

Product Nameplate Data :					
Rated Output	.33 HP	Hertz	60	NEMA Nom. Eff.	60
Volts	115/208-230	Phase	1	Power Factor	60
Full Load Amps	6/3.2-3	NEMA Design Code	N	Service Factor	1
Speed	1725	LR KVA Code	L	Rating - Duty	40C AMB-CONT

(Typical performance - Not guaranteed values)

General Characterstics at 230 V, 60 Hz, 0.33 HP			
Full Load Torque	1 LB-FT	Starting Current	13 Amps
Start Configuration	DOL	No-Load Current	2.6 Amps
Break Down Torque	2.95 LB-FT	Line-line Resistance @ 25° C	6.32 Ohms
Pull-Up Torque	2.55 LB-FT	Temperature Rise, C @ FL (in deg)	59
Locked-Roter Torque	3.6 LB-FT	Temp. Rise @ S.F. Load (in deg)	0

Load Characteristics at 230 V, 60 Hz , 0.33 HP							
% of Rated Load	25	50	75	100	125	150	S.F.
Power Factor	31	41	52	60	67	73	0
Efficiency	33	41	52	60	61.5	61.5	0
Speed (rpm)	1780	1760	1745	1725	1705	1680	0
Line Amperes	2.6	2.7	2.8	3	3.3	3.7	0

* For certified information, contact your local Baldor office.

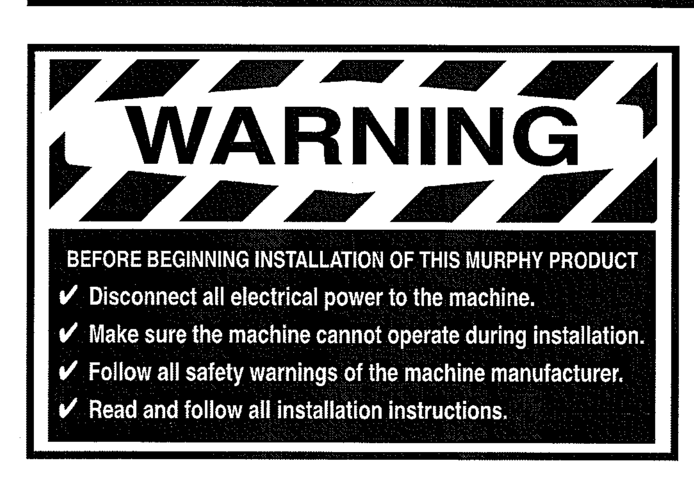
Shock/Vibration Control Switches Installation Instructions

Models: VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94



Please read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install the unit, and make sure installation conforms with NEC and local codes.

GENERAL INFORMATION





Model VS2EX

Description

The Murphy shock and vibration switches are available in a variety of models for applications on machinery or equipment where excessive vibration or shock can damage the equipment or otherwise poses a threat to safe operation. A set of contacts is held in a latched position through a mechanical latch and magnet mechanism. As the level of vibration or shock increases an inertia mass exerts force against the latch arm and forces it away from the magnetic latch causing the latch arm to operate the contacts. Sensitivity is obtained by adjusting the amount of the air gap between the magnet and the latch arm plate.

Applications include all types of rotating or reciprocating machinery such as cooling fans, engines, pumps, compressors, pump jacks, etc.

Models

VS2: Base mount; non hazardous locations.

VS2C: C-clamp mount; non hazardous locations.

VS2EX: Explosion-proof; Class I, Div. 1, Groups C and D.

VS2EXR: Explosion-proof with remote reset.

VS2EXRB: Explosion-proof; Class I, Div. 1, Group B; with remote reset.

VS94: Base mount; non hazardous locations, NEMA 4X/IP66.

Remote Reset Feature (VS2EXR, VS2EXRB and VS94 only)

Includes built-in electric solenoid which allows reset of tripped unit from a remote location. Standard on VS2EXR and VS2EXRB. Optional on VS94 (options listed below).

- **-R15:** Remote reset for 115 VAC
- **-R24:** Remote reset for 24 VDC

Time Delay Option (VS94 only)

Overrides trip operation on start-up. For VS94 series models, the delay time is field-adjustable from 5 seconds up to 100 seconds with a 20-turn potentiometer (5 seconds per turn approximately). Options listed below:

- **-T15:** Time delay for 115 VAC
- **-T24:** Time delay for 24 VDC

Space Heater Options (VS94 only)

This optional space heater board prevents moisture from condensing inside the VS94 Series case. Options listed below:

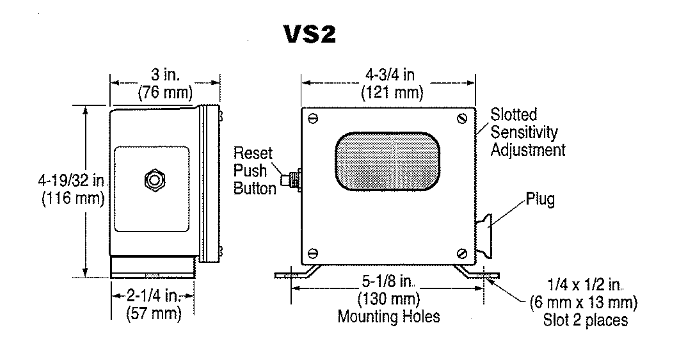
- **-H15:** Space heater for 115 VAC
- **-H24:** Space heater for 24 VDC

Warranty

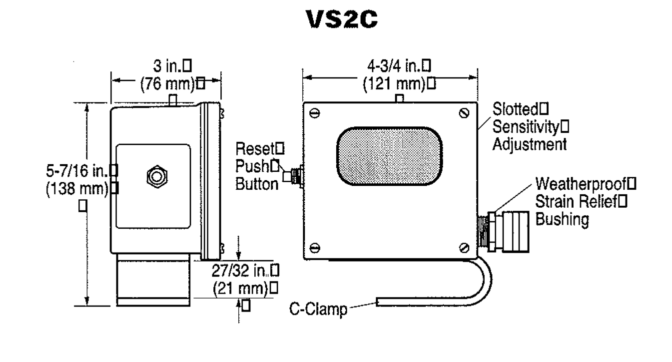
A limited warranty on materials and workmanship is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to www.fwmurphy.com/support/warranty.htm

DIMENSIONS

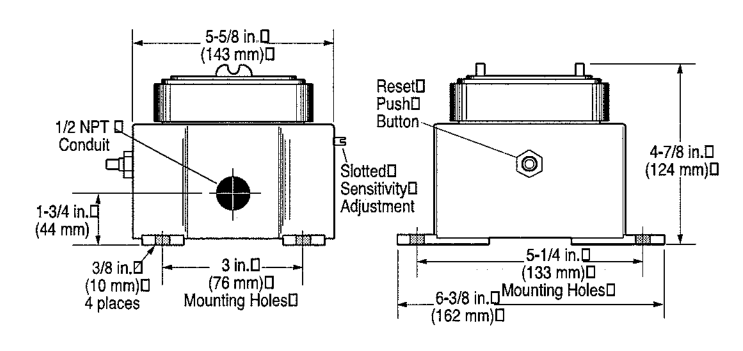
VS2



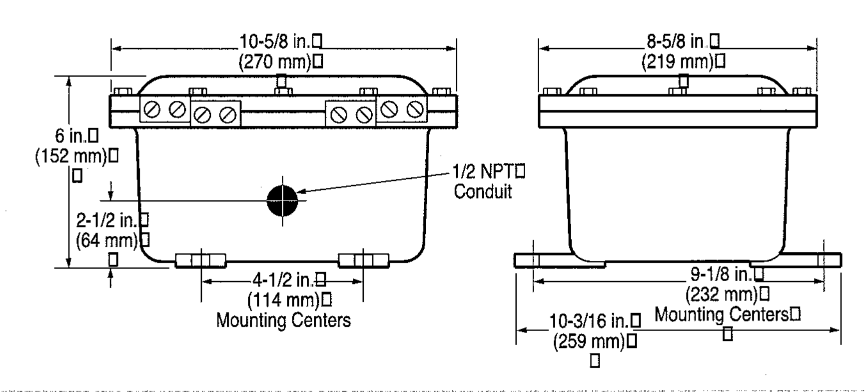
VS2C



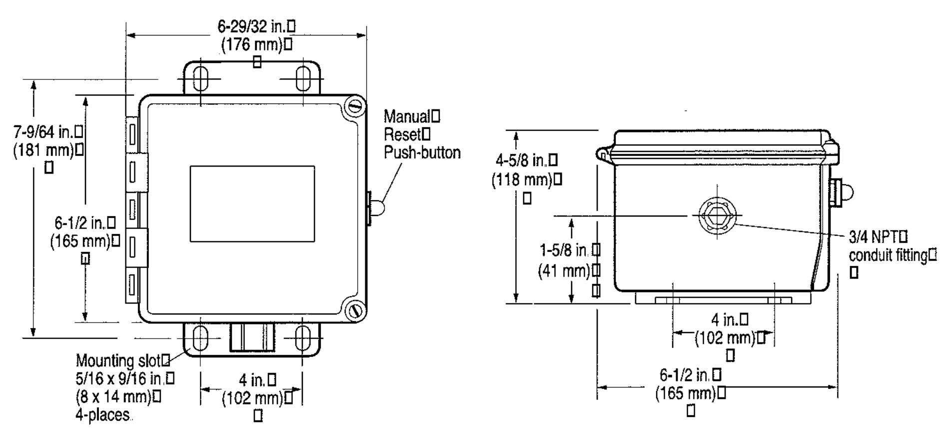
VS2EX and VS2EXR



VS2EXRB



VS94



SPECIFICATIONS

VS2 and VS2C

- **Case:** Weatherproof (equal to NEMA 3R) suitable for non-hazardous areas.
  VS2: *Base mount*
  VS2C: *C-clamp mount. Includes 45 feet (13.7 meters), 2-conductor 16 AWG, 30 strands/0.25 mm strand dia. (1.5 mm²) cable, and five cable hold down clamps.*
- **Contacts:** SPDT double make leaf contacts, 5A @ 480 VAC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS2EX

- **Case:** Explosion-proof and weatherproof aluminum alloy housing; meets NEMA 7/IP50 specifications; Class I, Division 1, Groups C & D; UL and CSA listed*
  VS2EX: *base mount.*
- **Snap-switches:** 2-SPDT snap-switches; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.
  - **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Normal Operating Temperature:** -40 to 140°F (-40 to 60°C).

VS2EXR

- **Case:** Same as VS2EX.
- **Snap-switch:** 1-SPDT snap-switch and reset coil; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset (optional):**

Option	*Operating Current*
-R15:	*350 mA @ 115 VAC*
-R24:	*350 mA @ 24 VDC*

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Normal Operating Temperature:** -40 to 140°F (-40 to 60°C).

VS2EXRB

- **Case:** Explosion-proof aluminum alloy housing; rated Class I, Division 1, Group B hazardous areas.
- **Snap-switch:** 1-SPDT snap-switch with reset coil (option available for additional SPDT switch); 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset:**

Option	*Operating Current*
-R15:	*350 mA @ 115 VAC*
-R24:	*350 mA @ 24 VDC*

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS94

- **Case:** Polyester fiberglass reinforced; NEMA type 4 and 4X; IP66; CSA types 4 and 12.
- **Conduit Fitting:** 3/4 NPT conduit fitting connection.
- **Normal Operating Ambient Temperature:** 0 to 140°F (-18 to 60°C).
- **Snap-switches:** 2-SPDT snap acting switches; 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Heater (optional):**

Option	*Operating Current*
H15	*.023 A @ 115 VAC*
H24	*.12 A @ 24 VDC*

- **Remote Reset (optional):**

Option	*Operating Current*
R15	*.17 A @ 115 VAC*
R24	*.36 A @ 24 VDC*

- **Time Delay (optional):**

Option	*Operating Current*	*Standby Current*
T15	*.360 A @ 115 VAC*	*.01 A @ 115 VAC*
T24	*1.15 A @ 24 VDC*	*.01 A @ 24 VDC*

- **Time Delay/Remote Reset:** Adjustable 20-turn potentiometer from 5 seconds to 100 seconds (5 seconds per turn approximately).

*CSA and UL listed with 480 VAC rating

INSTALLATION



WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

The VS2 and VS94 series shock switches are sensitive to shock and vibration in all three planes of motion - up/down, front/back and side/side. Front/back is the most sensitive (The reset pushbutton is located on the "front" of the unit). For maximum sensitivity mount the unit so that the front faces into the direction of rotation of the machine. (See Dimensions on page 2 for sensitivity adjustment location).

The VS2 and VS94 Series must be firmly attached/mounted to the machine so that all mounting surfaces are in rigid contact with the mounting surface of the machine. For best results, mount the instrument in-line with the direction of rotating shafts and/or near bearings. In other words, the reset push button should be mounted pointing into the direction of shaft rotation (see page 5). It may be necessary to provide a mounting plate or bracket to attach the VS2 and VS94 Series to the machine. The mounting bracket should be thick enough to prevent induced acceleration/vibration upon the VS2 or VS94 Series. Typically 1/2 in. (13mm) thick plate is sufficient. See illustrations on page 5 for typical mounting locations.



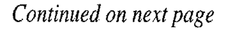
CAUTION: A dust boot is provided on the reset pushbutton for all series to prevent moisture or dust intrusion. The sensitivity adjustment for model VS2EX is not sealed; therefore, mounting orientation should be on a horizontal plane or with the sensitivity adjustment pointing down. Sensitivity adjustment for model VS2 is covered by a plug. The plug must be in place and tight to prevent moisture or dust intrusion.

C-Clamp Installation (VS2C model only)

A C-Clamp is supplied with the VS2C model only. The C-Clamp is shipped installed on the VS2C but must be installed on the VS2EX and VS2EXR switches.

1. The C-Clamp **(B)** will already be installed on a 1/4 in. (6 mm) thick steel mounting plate **(A)**. Bolt the VS2 switch to the mounting plate as illustrated — with four 5/16 in. bolts, nuts, and washers.
2. The mounting location should provide convenient access to the TATTLETALE® push button **(C)**.
3. The hardened set screw and nuts **(D)** are used to tighten the switch to an I-Beam or cross member such as a Sampson post of an oilwell pumpjack.

A
B
C
D


Continued on next page

All Models



WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

1. Firmly secure the unit to the equipment using the base foot mount or C-Clamp if applicable. See *C-Clamp Installation* page 3.

   For oilwell pumpjacks attach the VS2 and VS94 Series to the Sampson post or walking beam. See *Typical Mounting Locations* page 5.
2. Make the necessary electrical connections to the vibration switch. See *Internal Switches,* page 6 for electrical terminal locations and page 7 for typical wiring diagrams. **DO NOT EXCEED VOLTAGE OR CURRENT RATINGS OF THE CONTACTS.** Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

NOTE: If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.

If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc or as otherwise required by applicable electrical codes. If conduit is not attached directly to the VS2 and VS94 Series switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A "drip loop" should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weathercap fail.

Sensitivity Adjustment



WARNING: REMOVE ALL POWER BEFORE OPENING THE ENCLOSURE. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON PERFORM ADJUSTMENTS, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES. DO NOT ADJUST SENSITIVITY WHILE THE MACHINE IS RUNNING. STAND CLEAR OF THE MACHINE AT ALL TIMES WHEN IT IS OPERATING.

All models of the VS2 and VS94 Series cover a wide range of sensitivity. Each model is adjusted to the specific piece of machinery on which it is installed. After the switch has been installed in a satisfactory location (see page 5) the sensitivity adjustment will be increased or decreased so that the switch does not trip during start-up or under normal operating conditions. This is typically done as follows:

1. **REPLACE ALL COVERS, LIDS, AND ELECTRICAL ENCLOSURES.**
2. Press the reset push button to engage the magnetic latch. To be sure the magnetic latch has engaged, observe latch through the window on the VS2 and VS2C (see DETAIL "A"). On the VS2EX, VS94 series the reset button will remain depressed meaning the magnetic latch has engaged.
3. Start the machine.
4. If the instrument trips on start-up, allow the machine to stop. Turn the sensitivity adjustment 1/4 turn clockwise, (adjustment for VS94 and VS2EXRB models is located within the box, see DETAIL "B").

DETAIL "A"

Reset Push button

Sensitivity Adjustment

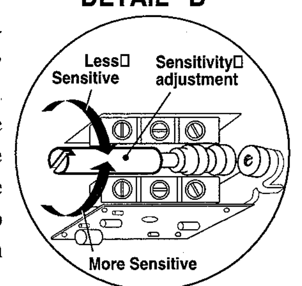


WARNING: MAKE THE AREA NON-HAZARDOUS BEFORE OPENING THE EXPLOSION-PROOF (-EX) ENCLOSURES.

Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.

5. If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment 1/4 turn counter-clockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment 1/4 turn clockwise (less sensitive). Restart the machine to verify that the instrument will not trip on start-up.
6. Verify that the unit will trip when abnormal shock/vibration exists.

DETAIL "B"



VS94 Time Delay Adjustment

1. Apply power to the time delay circuit. (see page 7 for time delay circuit). The time delay function will be initiated.
2. Time the length of the delay with a watch. Let time delay expire. After it expires, the override circuit will de-energize the solenoid, allowing the latch arm to trip. A clicking noise is heard.



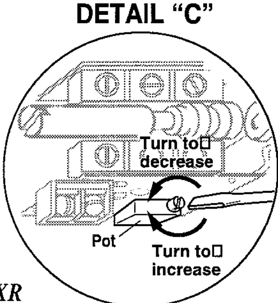
WARNING: REMOVE ALL POWER BEFORE OPENING ACCESS DOOR. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON ADJUST THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES.

3. **TURN THE POWER <u>OFF</u> TO RESET THE TIME DELAY CIRCUIT.**

NOTE: Allow 30 seconds bleed-time between turning the power "OFF" and "ON."

4. Locate the time adjustment pot (DETAIL "C"). The time is factory-set at the lowest setting (5 seconds approximately). To increase time, rotate the 20-turn pot clockwise as needed (5 seconds per turn approximately).
5. Repeat the above steps as necessary to obtain desired time delay.

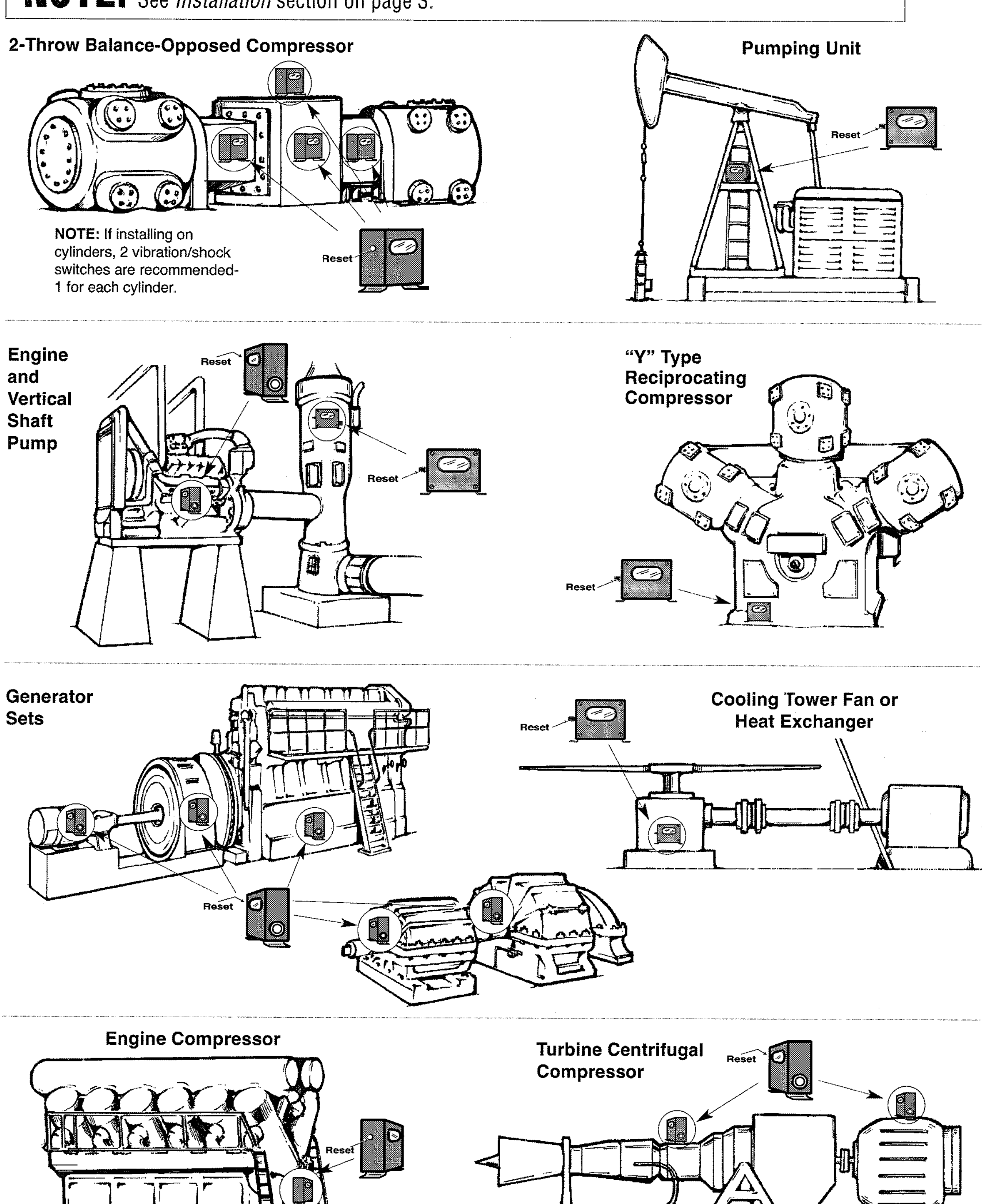
DETAIL "C"



NOTE: An external time delay can be used with the remote reset feature of the VS2EXR series to provide a remote reset and override of the trip operation on start-up. Time delay must automatically disconnect after equipment start-up.

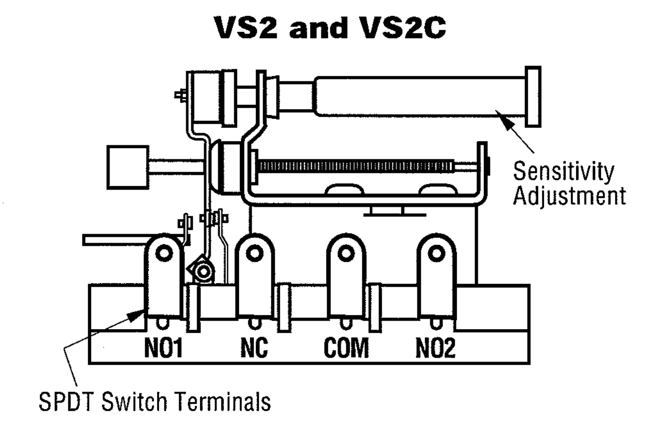
TYPICAL MOUNTING LOCATIONS

NOTE: These are typical mounting locations for best operation. Other mountings are possible. See *Installation* section on page 3.

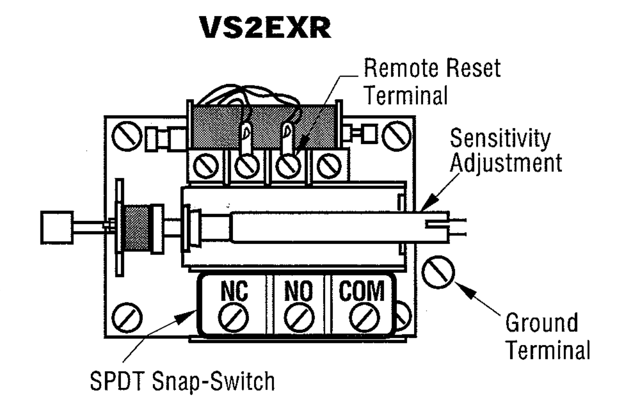


INTERNAL SWITCHES

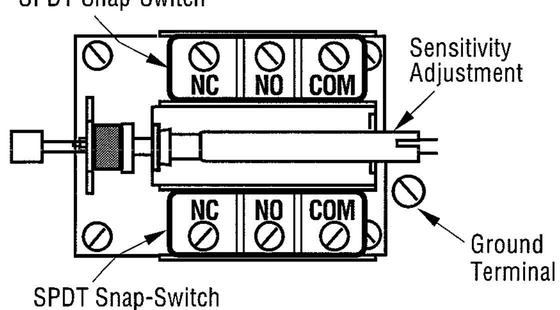
VS2 and VS2C



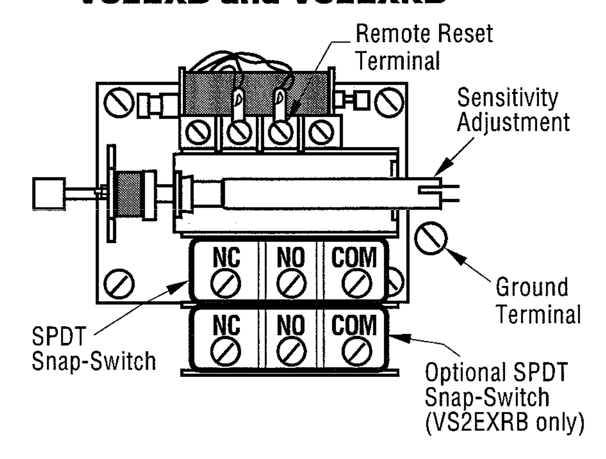
VS2EXR



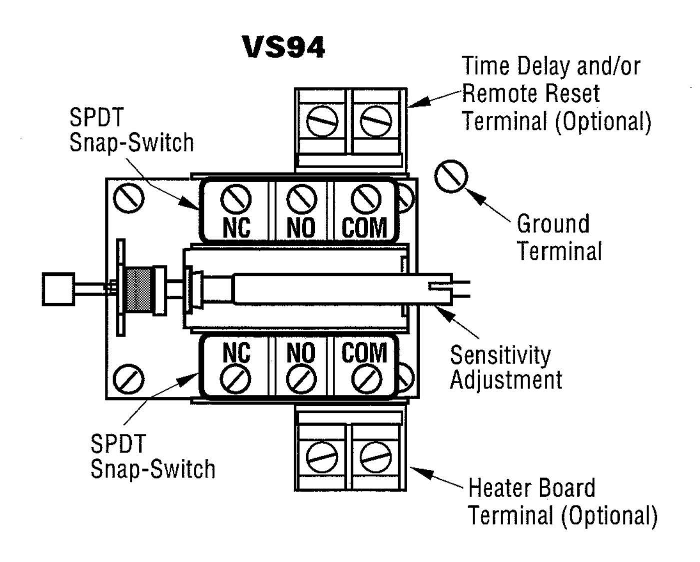
VS2EX



VS2EXB and VS2EXRB



VS94

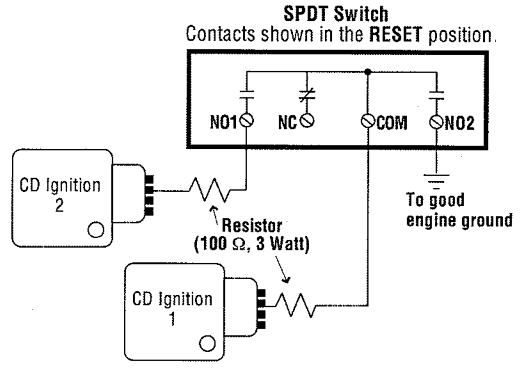


ELECTRICAL

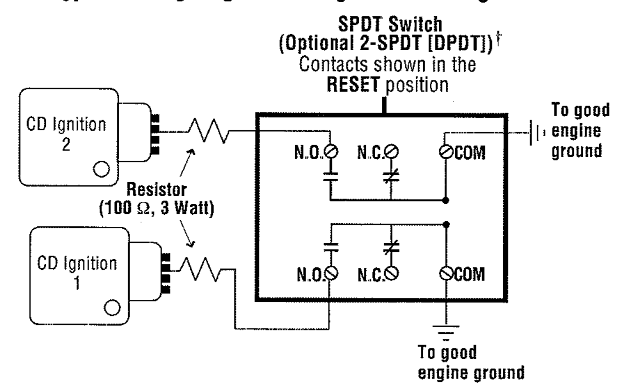


WARNING: REMOVE POWER BEFORE OPENING THE UNIT (ACCESS DOOR). STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING OPERATION. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON INSTALL AND WIRE THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND APPLICABLE CODES.

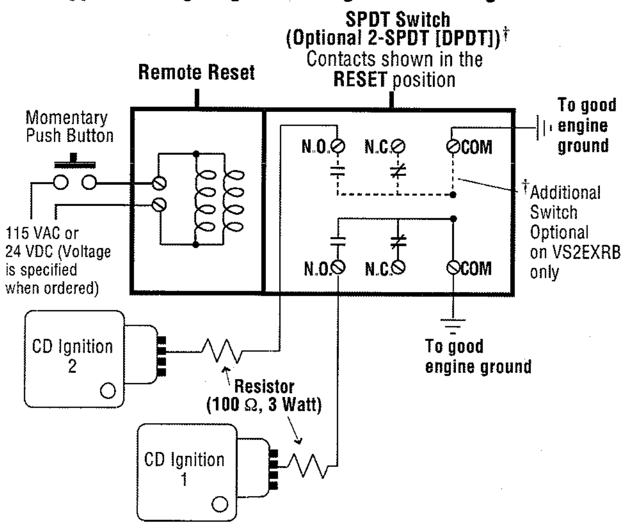
VS2 and VS2C
Typical Wiring Diagram for Single or Dual CD Ignition



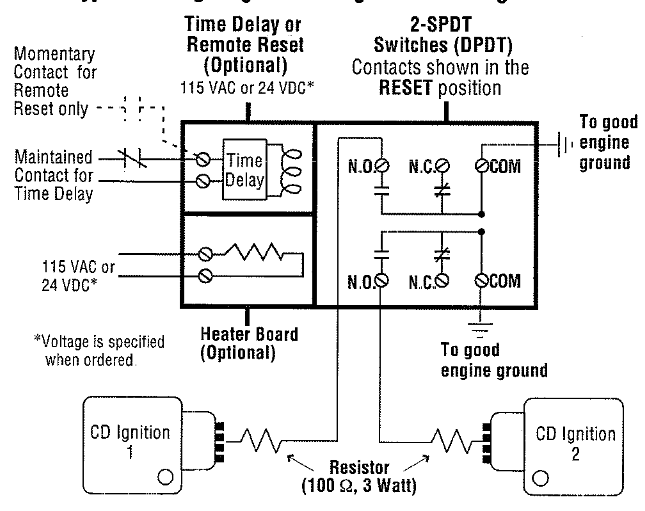
VS2EX
Typical Wiring Diagram for Single or Dual CD Ignitions



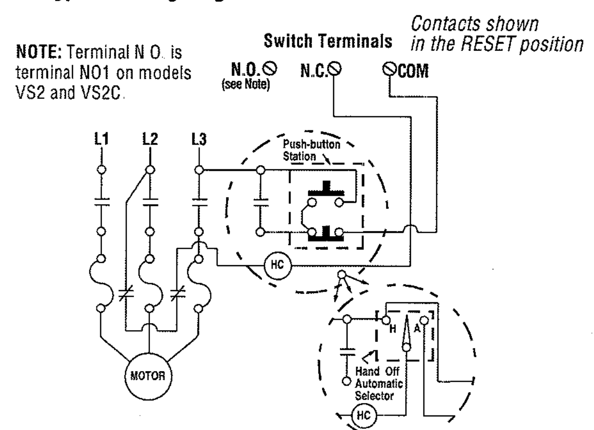
VS2EXR and VS2EXRB
Typical Wiring Diagram for Single or Dual CD Ignitions



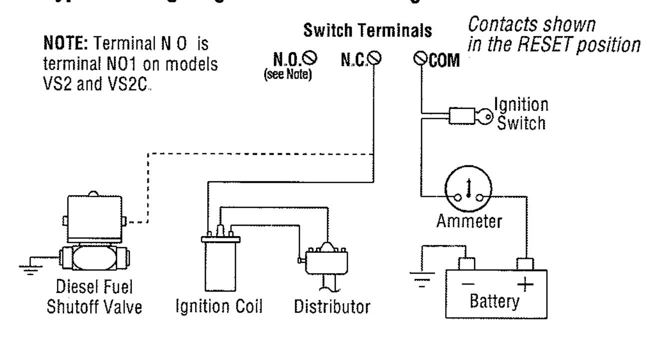
VS94
Typical Wiring Diagram for Single or Dual CD Ignitions



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94
Typical Wiring Diagram for Electric Motors



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94
Typical Wiring Diagram for Distributor Ignition or Diesel



SERVICE PARTS

PART NO.	DESCRIPTION

VS2

20000030	Movement assembly
20000031	Glass and gasket assembly
20000032	Reset push button assembly

VS2C

20000030	Movement assembly
20000031	Glass and gasket assembly
20000032	Reset push button assembly
20050021	Mounting clamp
20000185	VS2C 5-clamp hardware package assembly
20050465	2-Conductor electrical cable, 45 feet (13.7 meters)

VS2EX

20010091	Movement assembly
20050087	Cover
00000309	Cover gasket
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000289	C-clamp conversion mounting kit

VS2EXR

20000262	Movement assembly
20050087	Cover
00000309	Cover gasket
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000049	Reset solenoid assembly (115 VAC)
20000234	Reset solenoid assembly (24 VDC)
20000289	C-clamp conversion mounting kit

PART NO.	DESCRIPTION

VS2EXRB

20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000057	*Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000058	*Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000287	***Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20000290	***Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20050077	Adjustment shaft
20000262	Movement assembly
20000049	Reset solenoid assembly (115 VAC)
20000234	Reset solenoid assembly (24 VDC)

VS94 Series

25050506	Dust boot
00000232	Conduit fitting
20010090	Snap-switch and insulator kit (1 switch per assembly) **prior to September 1, 1995.****
20000288	**Snap-switch and insulator kit (1 switch per assembly) for models manufactured on September 1, 1995 or later.*****

* If no date code is found, refer to the old switch. Models with date 0895 and before use old switch. Dated 0995 after, use straight snap-switch arm, no rollers.

** Models dated Q1 thru Q8 (formed snap-switch arm and rollers).

***Models date coded Q9 thru Q12 and R1 thru R12 (straight snap-switch arm, no rollers).

FW MURPHY
P.O. Box 470248
Tulsa, Oklahoma 74147 USA
+1 918 317 4100 Fax: +1 918 317 4266
E-mail: sales@fwmurphy.com

INDUSTRIAL PANEL DIVISION
Fax: 918 317 4124
E-mail: ipdsales@fwmurphy.com

MURPHY POWER IGNITION
Web site: www.murphy-pi.com

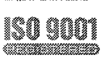
www.**fwmurphy**.com

CONTROL SYSTEMS & SERVICES DIVISION
P.O. Box 1819
Rosenberg, Texas 77471 USA
Phone: 281.633.4500 Fax: 281.633.4588
E-mail: sales@fwmurphy.com
Web site: www.fwmurphy.com

FRANK W. MURPHY, LTD
Church Rd Laverstock
Salisbury SP1 1QZ UK
Phone: +44 1722 410055 Fax: +44 1722 410088
E-mail: sales@fwmurphy.co.uk
Web site: www.fwmurphy.co.uk

COMPUTRONIC CONTROLS, LTD
41 - 43 Railway Terrace Nechells
Birmingham B7 5NG UK
Phone: +44 121 327 8500 Fax: +44 121 327 8501
E-mail: info@computroniccontrols.com
Web site: www.computroniccontrols.com

FW MURPHY INSTRUMENTS (HANGZHOU) CO. LTD
77 23rd Street
Hangzhou Economic & Technological Development Area
Hangzhou, Zhejiang, 310018, China
Phone: +86 571 8684 8886 Fax: +86 571 8684 8878



Printed in U.S.A. 078792

In order to consistently bring you the highest quality, full featured products, we reserve the right to change our specifications and designs at any time

Boston Gear®

ORC Series

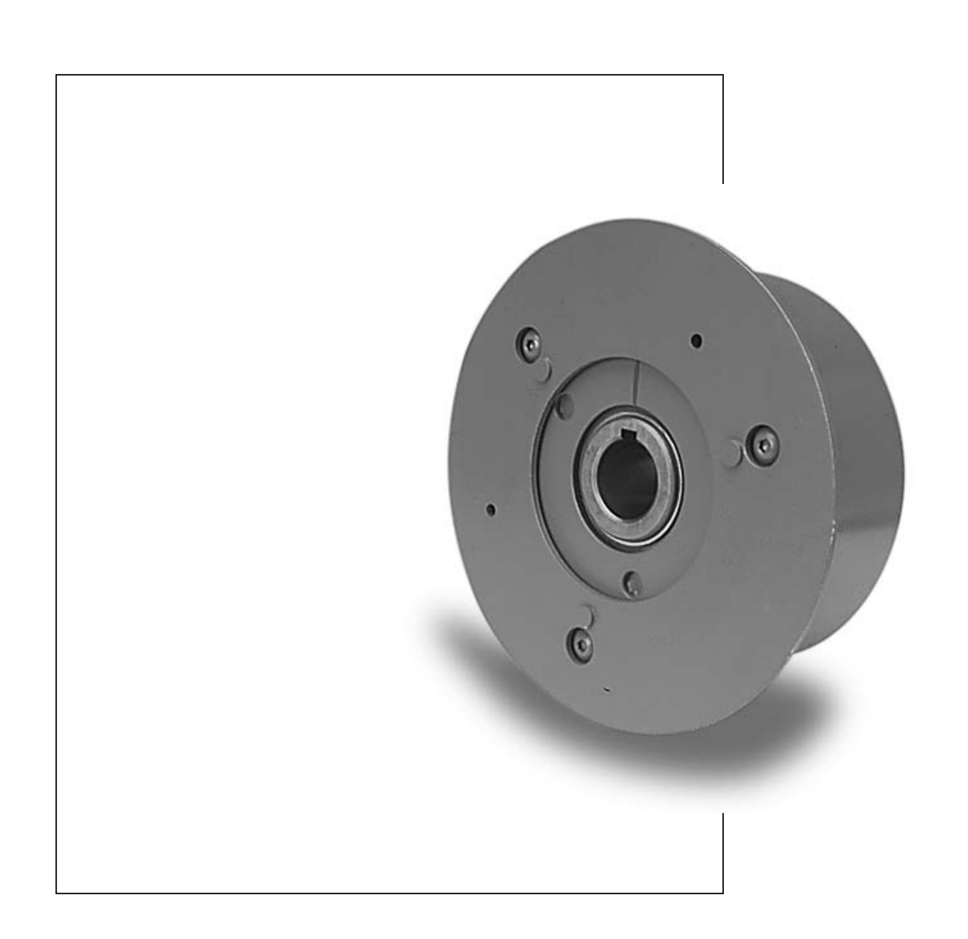
Trig-O-Matic™

Overload Release Clutches

Installation and Maintenance Instructions

Doc. No.

ORC Series
Model S





www.bostongear.com

ORC SERIES
TRIG-O-MATIC™

OVERLOAD RELEASE CLUTCHES – STANDARD MODEL S

INSTALLATION AND MAINTENANCE INSTRUCTIONS

I. INTRODUCTION

A. Operating Principle

The ORC Series, Model S Overload Release Clutch consists of two basic components: the rotor and the housing assembly. The clutch rotor is keyed and secured to a shaft with a setscrew.

The housing assembly includes a drive pawl and a reset pawl which are pivoted within the clutch housing. The drive pawl is held engaged in the rotor notch by the combined compression of the drive and reset springs as shown in Figure 1. The combined compression of these two springs determines the maximum torque which will be transmitted without overload. With the clutch in the engaged position shown in Figure 1, the rotor and the housing are held together and the entire unit rotates with the drive shaft at the same speed.

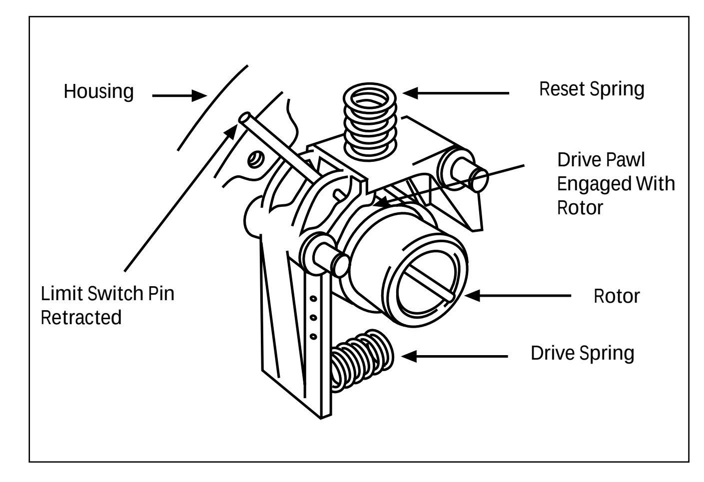


FIGURE 1 ENGAGED

TABLE OF CONTENTS

When an overload occurs, the rotor rotates from its normal position within the housing. At this instant, the combined compression of the drive and reset springs is overcome. For a manual reset clutch, the drive pawl is forced out of its engaged position from the rotor and as it pivots up, the reset pawl lifts and locks the drive pawl out of contact with the rotor as shown in Figure 2. The clutch is then free to rotate until it is reset. For a clutch with the automatic reset feature, the reset pawl applies pressure to the top of the drive pawl, holding it in contact with the rotor as shown in Figure 3.

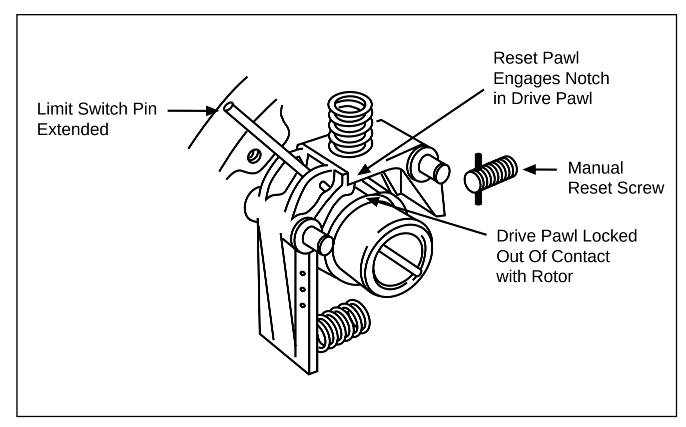


FIGURE 2 DISENGAGED MANUAL

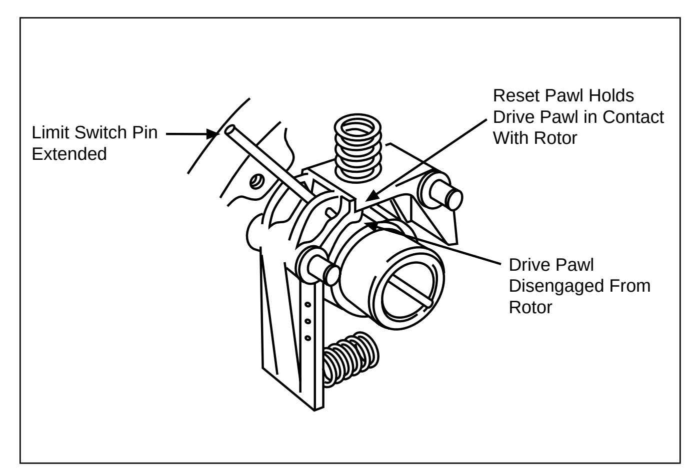


FIGURE 3 DISENGAGED AUTOMATIC

B. Resetting Instructions

1. Manual Reset
   a. After the overload condition has been corrected, rotate the drive until the rotor keyway is in alignment with the hole stamped 22 located on the outside diameter of the housing (see Figure 4).

   b. Reset the clutch by inserting a hex wrench into the reset screw shown in Figure 4, and turn the screw clockwise until the reset pawl releases the drive pawl. Refer to Table 5 for the proper wrench size.

   Note:
   Be sure not to use a powered wrench as it may cause damage to the reset pawl and/or reset spring!

   c. When the drive pawl enters the rotor notch, turn the wrench counterclockwise until the reset screw has stopped at its original position, which is approximately flush with the O.D. of the clutch housing. This is essential to restore the torque to its original setting.

2. Automatic Reset
   After one complete revolution the drive pawl will automatically return to its original engaged position. After the overload condition has been corrected "jog" the drive until the drive pawl engages with the rotor.

C. Torque Adjustment

The clutch is supplied with a torque selector dial. This dial makes torque adjustments on the clutch possible. There are mill marks on the housing near the hole stamped 9 on the outside diameter of the housing. The mill marks have stamped values indicating a set, or minimum and maximum torque (see Figure 5). If a drastic change in torque is desired, it may be necessary to change springs. See Section VI for spring replacement.

1. Increasing the Torque.
   a. **Disengage** the clutch.

   b. Turn the torque adjustment screw clockwise until it is flush with the milled depth of the desired torque setting and the red scribed lines are in line with each other.

   c. Reset the clutch and check its operation.

2. Decreasing the Torque.
   a. Make sure that the clutch is **engaged.**

   b. Turn the torque adjustment screw counter-clockwise until it is flush with the milled depth of the desired torque setting and the red scribed lines are in line with each other.

   c. Disengage the clutch and check its operation.

3. See Figure 6 for Limit Switch Actuating Mechanism adjustment.

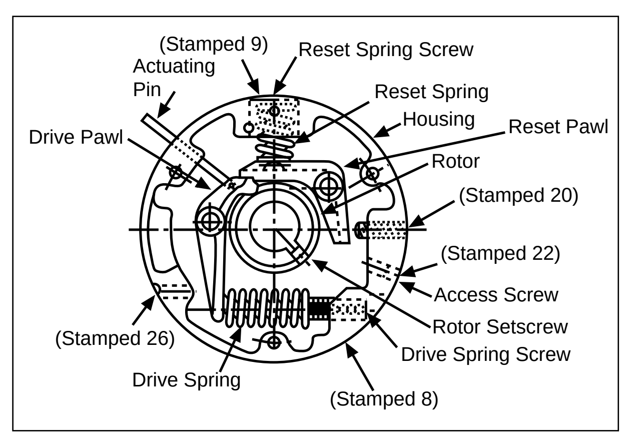


FIGURE 4 – CLUTCH INTERNAL COMPONENTS

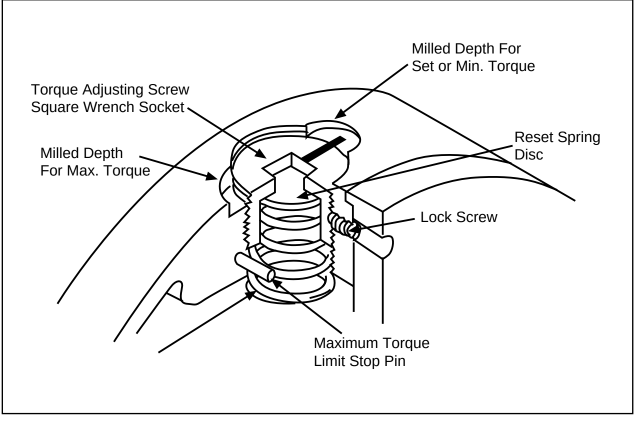
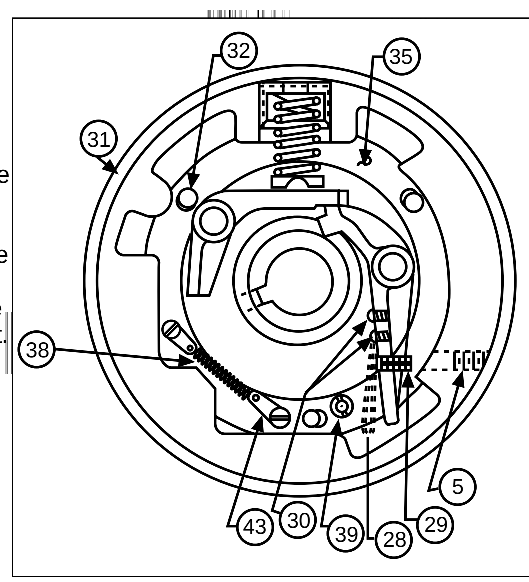


FIGURE 5

LIMIT SWITCH ACTUATING MECHANISM (LSAM)

If the torque output of the clutch is altered, it may be necessary to adjust the actuating mechanism. This is accomplished by first disengaging the clutch, then removing access plug #5 and inserting an allen wrench into the actuating adjusting screw #29. (Refer to Table 5 for wrench sizes). Rotate adjusting screw #29 until the spring pressure applied by the actuating spring #28 against the actuating stud nut #39 is sufficient to release the actuating plate #31. The adjustment should then be tested by resetting the clutch and then disengaging it. If the adjustment is correct, the actuating plate will release at the exact time of clutch disengagement. Replace plug #5.



- 5 Adjustment Access Plug
- 35 Release Ring
- 31 Actuating Plate
- 32 Trip Pin
- 38 Return Spring
- 39 Actuating Stud Nut
- 28 Actuating Spring
- 29 Actuating Adjusting Screw
- 30 Spring Mounting Screw
- 43 Spring Terminal

FIGURE 6

II. MOUNTING SPROCKETS OR SHEAVES TO CLUTCH

A. Type T Housing (Refer to Figure 7)

1. Inspect mating pilots on clutch and sprocket or sheave for nicks or burrs and remove as required.
2. Position sprocket or sheave on housing and align dowel pin holes.
3. Attach sprocket or sheave to housing with mounting bolts and high collar lock washers. Refer to Table 1 for recommended seating torques.
4. Finish ream sprocket or sheave for dowel pin. Refer to Table 1 for dowel pin and recommended ream sizes.
5. Install dowel pins to a point where they bottom in housing.

TABLE 1 - SPROCKET MOUNTING SCREW SEATING TORQUES

Size	Screw Size	Qty.	Dowel Size	Qty.	Seating Torque	Ream Size
1	1/4-20	3	1/4	1	150 in-lb	.2495
2	5/16-18	3	5/16	1	305 in-lb	.3120
3	3/8-16	4	3/8	1	545 in-lb	.3745
4	1/2-13	4	1/2	1	1,300 in-lb	.4995
5	5/8-11	6	5/8	1	2,530 in-lb	.6245
6	5/8-11	6	5/8	1	2,530 in-lb	.6245

B. Type B Housing

A Type B is a basic unit and is sold without any mounting hole arrangement. It is modified by the customer for special applications. Refer to Figure 8.

TABLE 2 - MINIMUM NUMBER OF TEETH OF STANDARD PLATE SPROCKETS ADAPTABLE TO TYPE T CLUTCH

Clutch Size	CHAIN SIZE AND PITCH										
	#25 1/4 Pitch	#35 3/8 Pitch	#40 1/2 Pitch	#41 1/2 Pitch	#50 5/8 Pitch	#60 3/4 Pitch	#80 1 Pitch	#100 1-1/4 Pitch	#120 1-1/2 Pitch	#140 1-3/4 Pitch	#180 2 Pitch
1	40	28	22	22	18	—	—	—	—	—	—
2	54	36	28	28	22	19	—	—	—	—	—
3	X	45	34	36	28	25	19	—	—	—	—
4	X	X	42	45	36	30	23	19	—	—	—
5	X	X	X	X	42	36	30	22	19	17	—
6	—	—	X	X	X	48	36	30	24	21	19

Notes:
1. X - On Application Only.
2. For smaller sprockets consult factory. As in most cases, a design modification can be made.

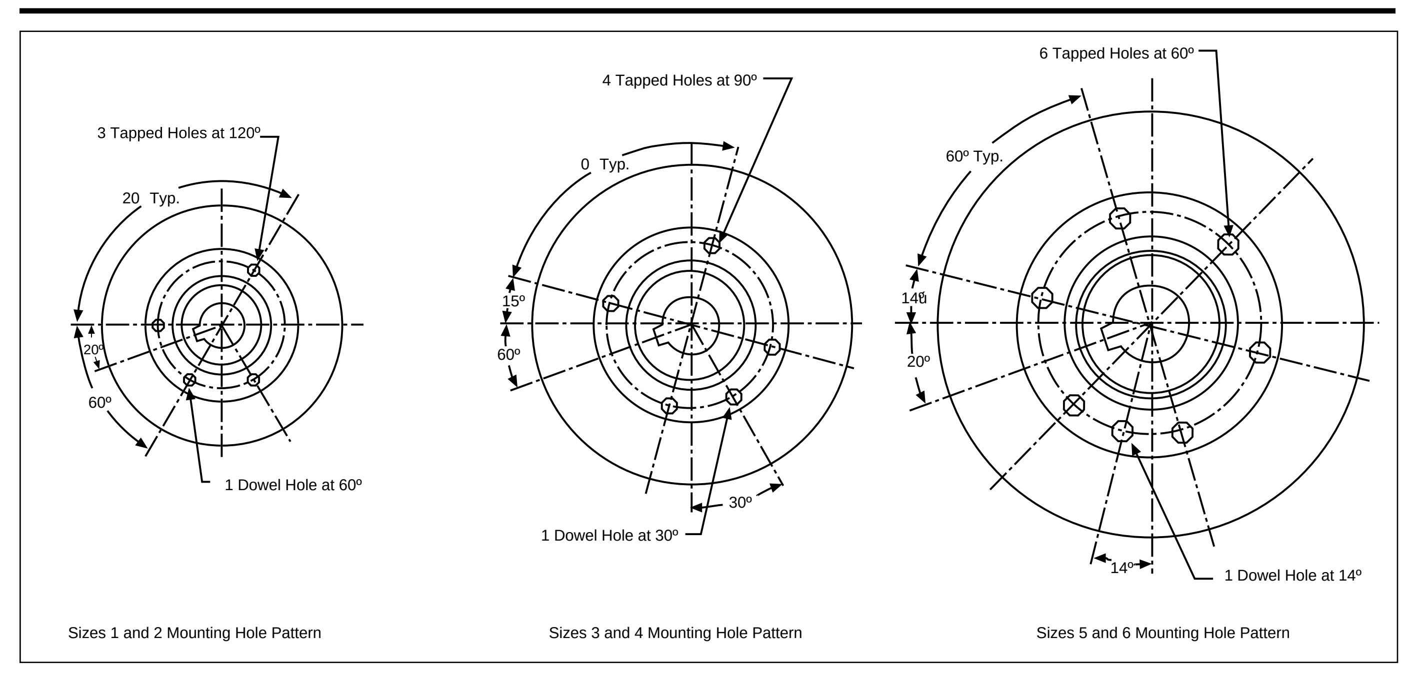


FIGURE 7 – TYPE T STANDARD MOUNTING HOLE PATTERNS

TABLE 3 - TYPE T MOUNTING HOLE PATTERNS

Size	Thread	Depth	Bolt Circle	Pilot Dia. +.000 -.002
1	1/4-20	.50	2.375	1.875
2	5/16-18	.50	3.000	2.250
3	3/8-16	.62	4.125	3.250
4	1/2-13	.87	5.000	3.203
5	5/8-11	1.00	6.250	4.125
6	5/8-11	1.00	8.750	6.000

Notes:

1. Mounting bolts must be minimum 160,000 PSI tensile, Rc 36-43.
2. Dowel pins must be minimum 150,000 PSI shear, Rc 50-58 core hardness.

TABLE 4 - TYPE B HOUSING DIMENSIONS

Size	A	B	C	D	E	F +.000 -.002	G
1	.81	.81	1.06	.11	.31	1.500	.69
2	.90	1.25	1.37	.18	.37	1.875	.81
3	1.25	1.62	1.94	.29	.50	2.750	.94
4	1.56	2.12	2.37	.43	.56	2.828	1.48
5	1.94	2.62	3.00	.58	.69	4.000	1.62
6	2.62	3.50	3.87	.90	.87	5.500	2.00

Note:

The “E” Dimension on Table 4 shows pawl trunnion holes. These holes are not through holes and they should be avoided when mounting a coupling, sprocket, etc. to the clutch.

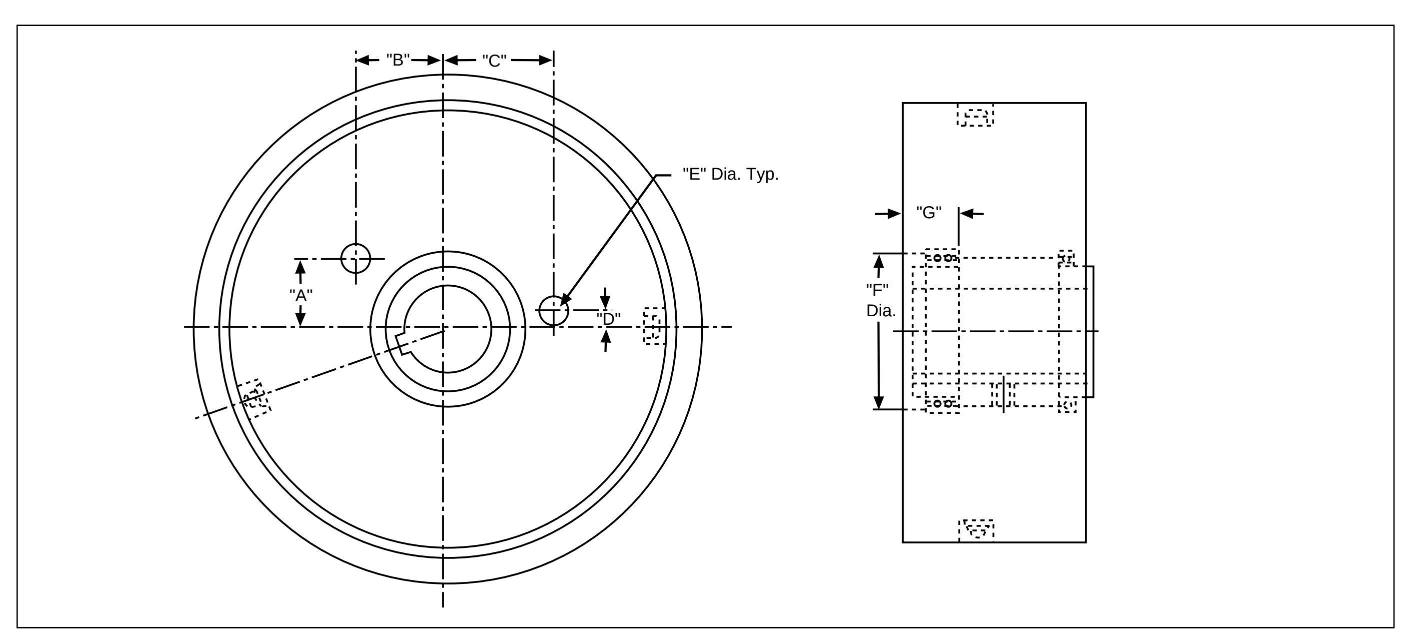


FIGURE 8 – TYPE B HOUSING CONFIGURATION

III. LOCATING AND MOUNTING CLUTCH AND COUPLINGS TO SHAFT

A. Location

The clutch should always be located as close as possible to the source of an overload condition. Figures 9 through 12 indicate both preferred and not preferred locations for mounting an ORC Series, Model S Overload Release Clutch.

Note:

Clutch mounted sprockets, etc. and couplings should be positioned as close to a supporting bearing as possible to minimize overhung loads. A minimum shaft engagement of 1-1/2 times the shaft diameter is recommended for clutch and coupling flange installation.

1. Direct Drives
   a. Figure 9 shows the **preferred** location for mounting in a direct drive application. The clutch is mounted on the low speed side of the reducer, and transmits power from its housing, through its rotor to the driven shaft.

   b. Locating the clutch as shown in Figure 10 is **not preferred.** Here the clutch is mounted on the high-speed side of the reducer. Generally, mounting in this manner requires the clutch to be hypersensitive to perform satisfactorily.

2. Indirect Drives
   a. Either location of the clutch shown in Figure 11 is **preferred** in indirect drive applications.

   b. The mounting location in Figure 12 is **not preferred** for the same reasons as those for Figure 10. Always consult the factory when a mounting of this type is necessary.

B. Mounting Basic Clutch

1. Inspect shaft and key for any nicks or burrs and remove any that may be present.
2. Remove the access screw from the hole stamped 22 outside of the clutch housing. Make sure that the clutch is engaged where the rotor keyway is in line with the hole stamped 22.
3. Position shaft key and slide clutch onto shaft.
4. Align sprocket or sheave mounted to clutch with mating sprocket or sheave in drive train. Refer to installation and alignment instructions furnished with sprocket or sheave.

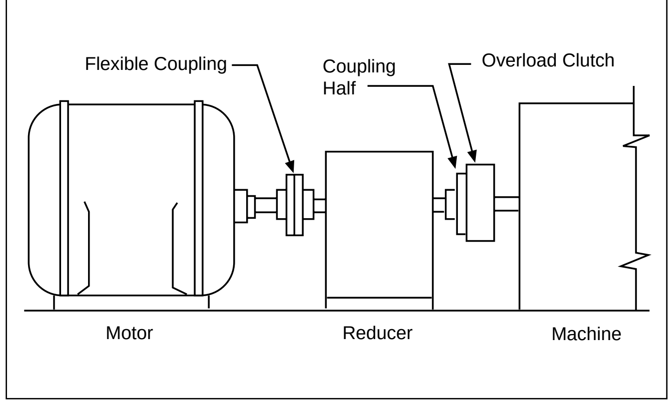


FIGURE 9

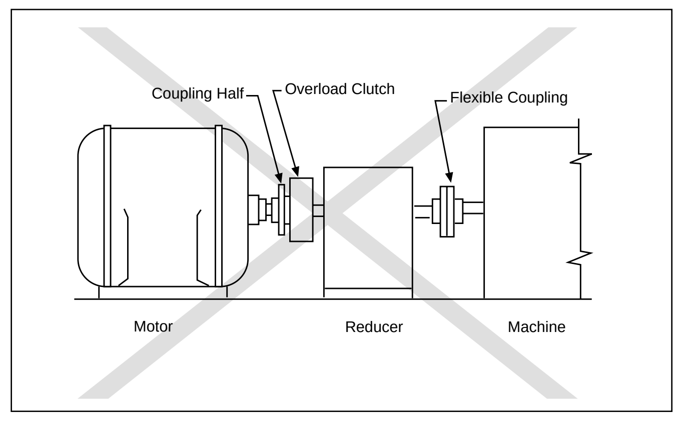


FIGURE 10

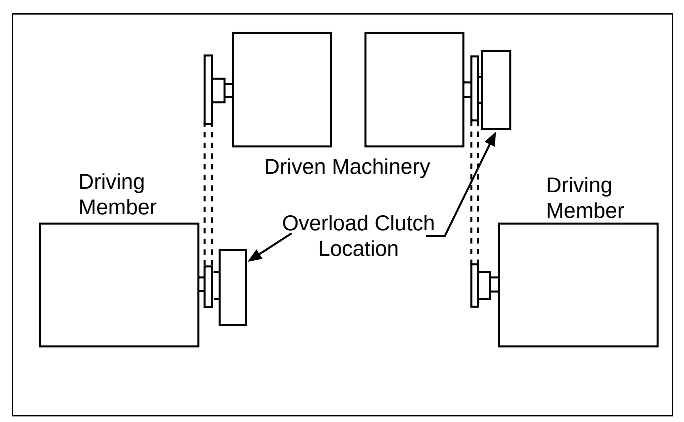


FIGURE 11

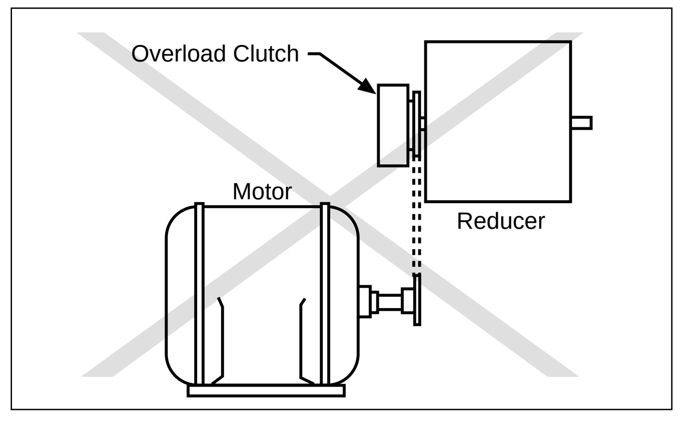


FIGURE 12

TABLE 5 - WRENCH SIZE CHART

Clutch Size	Drive Spring Screw Hex Wrench	Reset Spring Screw Square Wrench	Manual Reset Screw Hex Wrench	Rotor Setscrew Hex Wrench	Access Screws Hex Wrench	Locking Screw Hex Wrench	Adjustment Screw Hex Wrench
1	3/16	3/8	3/16	3/32	1/8	3/32	1/16
2	1/4	3/8	1/4	1/8	5/32	3/32	5/64
3	5/16	1/2	5/16	3/16	3/16	1/8	1/8
4	5/16	1/2	3/8	1/4	5/16	1/8	1/8
5	3/8	1/2	1/2	5/16	5/16	1/8	1/8
6	3/4	3/4	1/2	5/16	5/16	1/8	1/8

5. Select the correct hex wrench from Table 5 and insert it through the hole stamped 22 in the housing. Tighten the rotor setscrew securing the clutch to the shaft.

   Note:
   Turn wrench clockwise only! Do not remove setscrew from rotor!

   Refer to Table 6 for recommended setscrew seating torques.

6. Remove the hex wrench and replace access screw in the housing.

C. Mounting Type "C" Flexible Coupling

1. After the clutch has been mounted on its shaft as explained in Section lll, inspect the coupling shaft and key for any nicks or burrs and remove any that are present.
2. Make sure that the coupling shaft keyway is in alignment with the clutch shaft keyway. Position shaft key and slide coupling onto the appropriate shaft.
3. Slide the coupling flange onto the coupling studs. The coupling flange and adapter should be separated by a gap of 1/8".
4. Secure the coupling to drive shaft by tightening the two setscrews located in the hub of the flange. Refer to Table 7 for recommended coupling setscrew seating torques.
5. Parallel Alignment
   a. Place a straightedge across the clutch housing and coupling flange as shown in Figure 13.
   b. Measure the offset around the periphery of these two components **without rotating** the shafts.
   c. If the difference in offset from any two points 180 degrees apart exceeds the maximum value shown in Table 8, the shafts must be realigned.
6. Angular Alignment
   a. Measure the gap around the periphery between the coupling flange and the clutch housing **without rotating** the shafts. Refer to Figure 14.
   b. If the difference between any two points 180 degrees apart exceeds the maximum angular misalignment shown in Table 8, the shafts must be realigned.

TABLE 6 - ROTOR SETSCREW SEATING TORQUES

Size	Screw Size	Seating Torque
l	10-32	36 in-lb
2	1/4-28	87 in-lb
3	3/8-24	290 in-lb
4	1/2-20	620 in-lb
5	5/8-18	1,325 in-lb
6	5/8-18	1,325 in-lb

TABLE 7- COUPLING SETSCREW SEATING TORQUES

Size	Setscrew Size	Seating Torque
1	5116-18	165 in-lb
2	3/8-16	290 in-lb
3	3/8-16	290 in-lb
4	1/2-13	620 in-lb
5	1/2-13	620 in-lb
6	1/2-13	620 in-lb

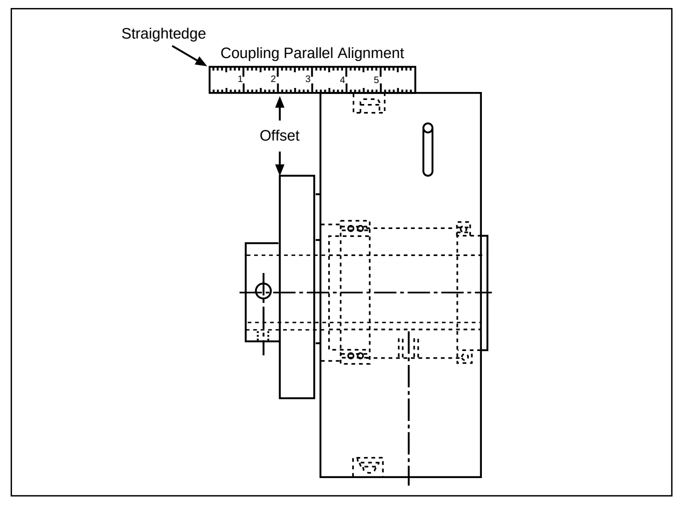


FIGURE 13

c. If a correction is required to satisfy angular alignment requirements, then recheck the parallel alignment.

TABLE 8 - TYPE "C" MISALIGNMENT

Size	Maximum Allowable Misalignment	
	Parallel	Angular
1	.012"	.074"
2	.015"	.091"
3	.016"	.102"
4	.027"	.159"
5	.031"	.183"
6	.045"	.231"

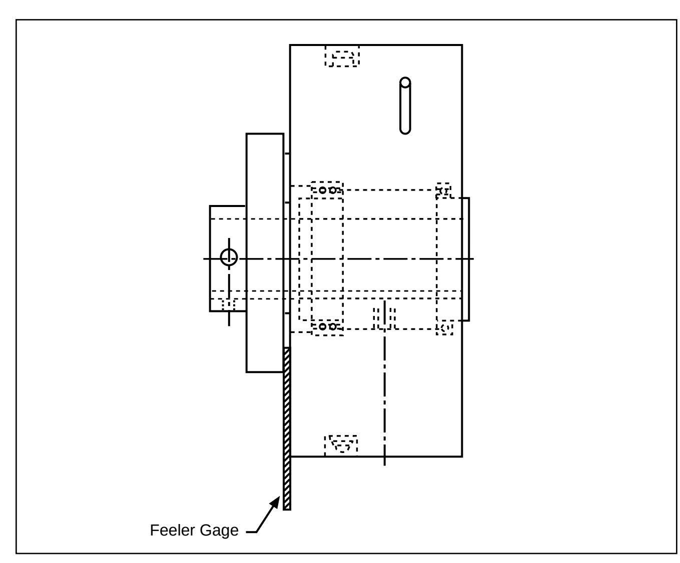


FIGURE 14

D. Mounting the "N" Index Coupling and Type "R" Rigid Coupling

1. After the clutch has been mounted on its shaft as explained in Section lll, inspect mating pilots of clutch and coupling for any nicks or burrs and remove any that are present.
2. Inspect coupling shaft and key for any nicks or burrs and remove any that are present.
3. In the case of a Type "R", make sure that the coupling shaft keyway is in alignment with the clutch shaft keyway. Position the shaft key and slide the coupling flange onto the shaft.
4. Slide the coupling onto the clutch housing making sure that the coupling pilot fits into the housing pilot and that the mounting holes are aligned. In the case of a Type "N" index coupling, make sure that the desired mounting slots are aligned with the clutch housing mounting holes.
5. Secure the coupling to the drive shaft by tightening the two setscrews located in the hub of the flange. Refer to Table 7 for recommended setscrew seating torques.
6. Parallel Alignment
   a. Place a straightedge across the clutch housing and coupling flange as shown in Figure 13.
   b. Measure the offset around the periphery of these two components **without rotating** the shafts.
   c. The shafts must be aligned until no offset exists or is equal at all points around the periphery.
7. Angular Alignment
   a. Measure the gap around the periphery between the coupling flange and clutch housing **without rotating** the shafts. Refer to Figure 14.
   b. The shafts must be aligned until no gap exists or is equal at all points around the periphery.
   c. If a correction is required to satisfy angular alignment requirements, then recheck the parallel alignment.

   Note:
   The Type "N" and "R" coupling connection is rigid and does not allow for forgiveness of parallel or angular misalignment. To eliminate unnecessary bearing loads, both shafts must be in near perfect alignment.
8. Loosen the coupling setscrews and attach coupling to clutch with hex head bolts and flat washers. Refer to Table 9 for recommended bolt seating torques. Secure coupling to drive shaft by tightening the setscrews to the recommended seating torques in Table 7.

TABLE 10 - COUPLING MOUNTING BOLT SEATING TORQUES

Size	Bolt Size	Seating Torque
1	5/16-18	160 in-lb
2	3/8-16	280 in-lb
3	1/2-13	700 in-lb
4	5/8-11	1,200 in-lb
5	5/8-11	1,200 in-lb
6	5/8-11	1,200 in-lb

IV. LIMIT SWITCHES

The ORC Series, Model S Overload Release Clutch is available with two types of limit switch actuators, a limit switch pin (LSAP) and a limit switch actuating mechanism (LSAM).

A. Limit Switch Pin

A Limit Switch Pin is furnished as a standard item to activate a limit switch that triggers the electrical controls. The Limit Switch Pin protrudes radially from the clutch housing and its travel is controlled by the drive pawl motion upon disengagement. The Limit Switch Pin can be used if the housing continues to rotate when an overload occurs and the rotor stops, i.e, the housing is the driver and the rotor is the driven. Housing RPM has to be considered to determine the time for the Limit Switch Pin to revolve around before contacting the limit switch. See Figure 15 for Limit Switch Pin Travel.

The standard Limit Switch Pin extension is 1 inch from the outside diameter of the clutch housing. It can also be made flush with the surface of the housing in an engaged position.

B. Limit Switch Actuating Mechanism

A Limit Switch Actuating Mechanism provides instant operation of a limit switch to immediately shut down the drive or actuate an alarm should an overload occur.

The mechanism is entirely contained in the clutch cover and is actuated by the motion of the drive pawl. When an overload occurs, the drive pawl motion releases the actuating plate and it trips a limit switch. The total travel of the plate is 5/16 of an inch (see Figure 15).

The actuating plate must be reset by manually pushing it back into position. The clutch must be engaged when resetting the plate or the plate will not reset when the clutch is disengaged.

A limit switch should be able to operate within the plate travel of 5/16 of an inch. The switch should be wired in parallel with a jog circuit so that the drive can then be indexed to the start/run circuit.

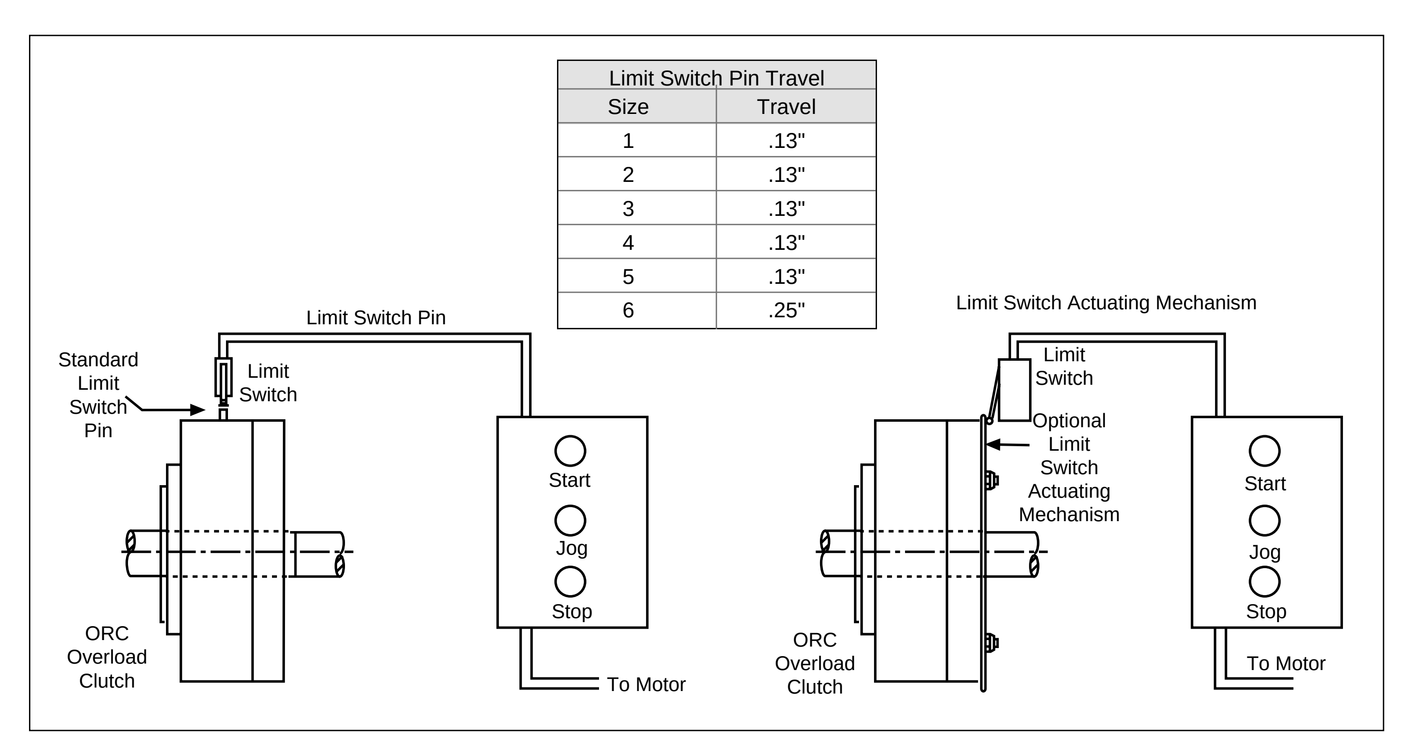
V. GENERAL MAINTENANCE

A. Lubrication

The Overload Release Clutch is prelubricated at the factory and is also equipped with a grease pack fitting. For optimum performance and wear resistance it is suggested that the clutch be lubricated with a Bentone type, NLGI grade 0 grease. The lubrication schedule should be in accordance with good operating practices for the equipment on which the clutch is mounted. The clutch is also supplied with a grease relief fitting. When there is enough grease in the clutch any excess grease will be extruded through the relief fitting.

B. Annual Inspection

The Overload Release Clutch is constructed of heavy duty materials. Under reasonably clean conditions the unit will operate with a minimum of maintenance. A scheduled annual inspection of bearings, pawls, rotor, springs, tripping mechanism, and other internal components is suggested. However, the actual frequency should be in accordance with good operating practices for the equipment on which the clutch is installed.



Limit Switch Pin Travel	
Size	Travel
1	.13"
2	.13"
3	.13"
4	.13"
5	.13"
6	.25"

FIGURE 15 – LIMIT SWITCH LAYOUT

VI. REPAIR INSTRUCTIONS

A. General Disassembly

1. All item numbers in parenthesis will refer to the key numbers shown in the clutch exploded view drawing and parts identification tables.
2. Place the clutch preferably in a three-jaw chuck with the actuating plate or cover facing up.
3. There are two locking screws (25) located on the face of the cover which lock down the reset spring screw (14) and the drive spring screw (21). Loosen these screws to relieve the pressure on the drive spring screw and reset spring screw.
4. Turn the reset spring screw (14) counterclockwise to relieve the compression on the reset spring (19).
5. Remove the sealing wax from the drive spring screw (21) and turn the screw counterclockwise to relieve the compression on the drive spring (18).
6. Remove the cover screws (27).
7. Pry off the cover (8). Use care not to break the inner pilot of the cover (see Figure 16).
8. Remove the reset screw (14) and take out the reset spring (19), and the ball thrust (20) through the hole stamped 9.

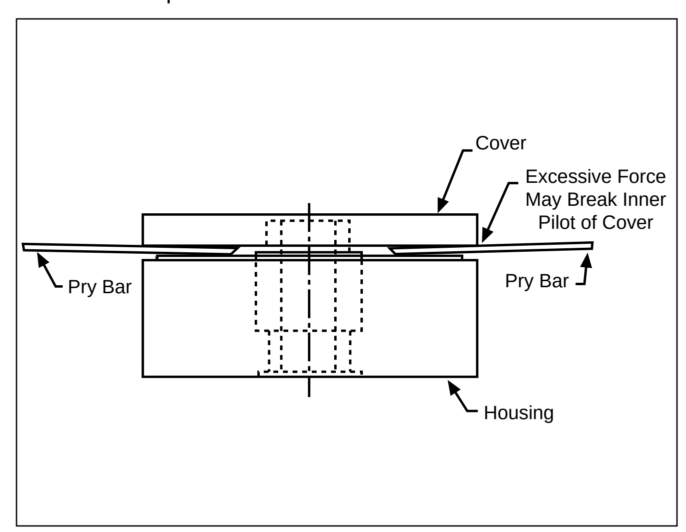


FIGURE 16

9. Remove the reset pawl (11) by simply lifting out.
10. Remove the drive pawl (10) and the drive spring (18). This will require a little more effort because of the slight pressure on the drive spring.
11. Remove the housing (1) from the mounting surface and press out the rotor (12).
12. If clutch is manual reset, remove the reset screw (24) by turning clockwise into the housing.
13. Inspect hardened bushings (3) in housing (1) and cover (8) for excessive wear.
14. Replace any worn or broken parts.

B. Basic Unit Assembly

1. If clutch is manual reset, install the reset screw (24) from the inside of the housing turning counter-clockwise until the reset screw pin stops the screw from turning.
2. Press the long end of rotor (12) into housing bearing (2).
3. This step is for manual reset only. Go to next step for automatic reset. Install the drive pawl (10) into the appropriate hole in the housing (1), and the reset pawl (11) into its appropriate hole in the housing. Check the fit of the reset pawl into the notch of the drive pawl with the clutch disengaged. The reset pawl should fit approximately one-third of the way into the notch. Grinding the nose of the reset pawl may be necessary to obtain the proper fit (see Figure 17).

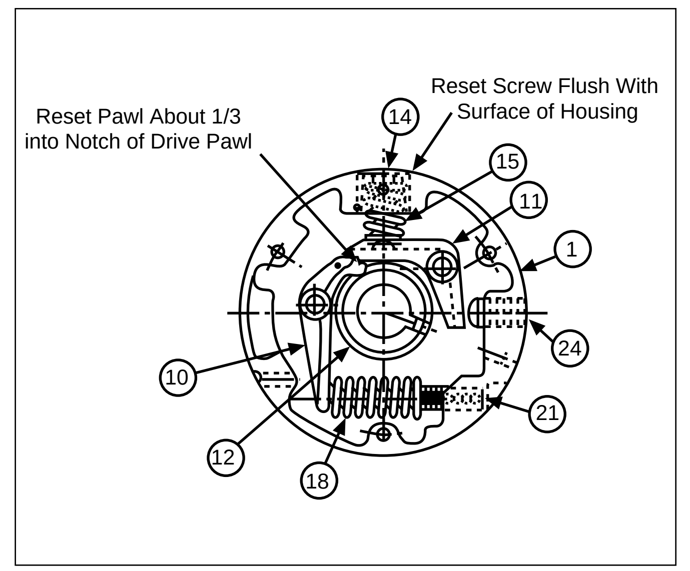


FIGURE 17

4. Remove the drive pawl (10). The drive pawl and the drive spring (18) will have to be installed simultaneously. If a drastic change in torque is desired, use this step to change the drive spring. Place one end of the drive spring over the drive spring thrust washer (22). Insert the knob of the drive pawl into the other end of the drive spring. Insert the trunnion of the drive pawl into the hardened bushing in the housing, while the nose of the drive pawl fits into the notch of the rotor (12).
5. Coat the inside of the housing and all components with a quality all-purpose grease. A Bentone type, NLGI grade 0 grease or equivalent is recommended.
6. Insert the reset spring disc (15) inside the reset spring screw (14). Apply grease to the surface of the disc.
7. If a drastic change in torque is desired, use this step to change the reset spring. Place the reset spring (19) on the surface of the reset spring disc. Apply grease to the end of the ball thrust (20) and insert ball thrust into the reset spring.
8. Apply grease to the threads of the reset spring screw (14) and insert the assembly of the reset spring screw, reset spring disc (15), reset spring (19), and ball thrust (20) through the hole stamped 9 on the housing. Tighten the reset spring screw until it is flush with the surface of the housing (Figure 17).
9. Fill the entire housing cavity with grease to ensure a proper grease packing.
10. Press the cover on to the housing assembly. Make sure that the trunnion holes and the cover screw holes line up.
11. Install the cover screws and tighten to the recommended seating torques in Table 13.

TABLE 13 - COVER SCREW SEATING TORQUES

Clutch Size	Screw Size	Qty.	Seating Torque
1	1/4-20	3	100 in-lb
2	5/16-18	3	200 in-lb
3	3/8-16	3	350 in-lb
4	1/2-13	4	850 in-lb
5	5/8-11	4	1,700 in-lb
6	5/8-11	4	1,700 in-lb

C. Torque Verification

1. Place the clutch in a chuck or vise with the cover facing upward.
2. Insert the appropriate size arbor and key into rotor (see Figure 18).

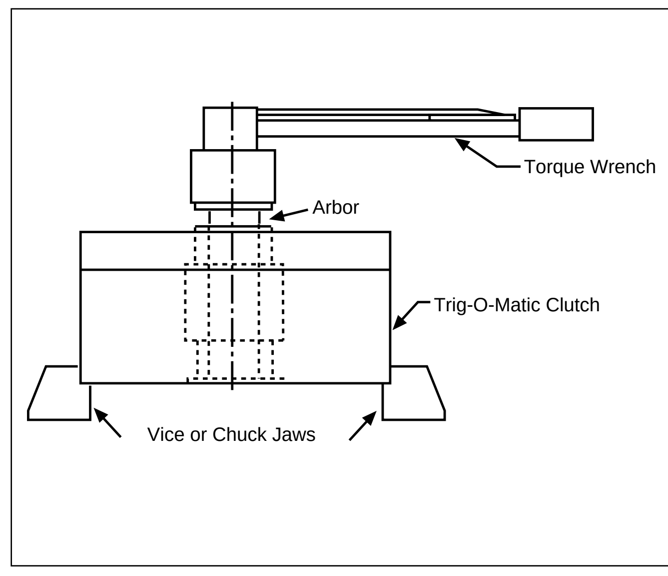
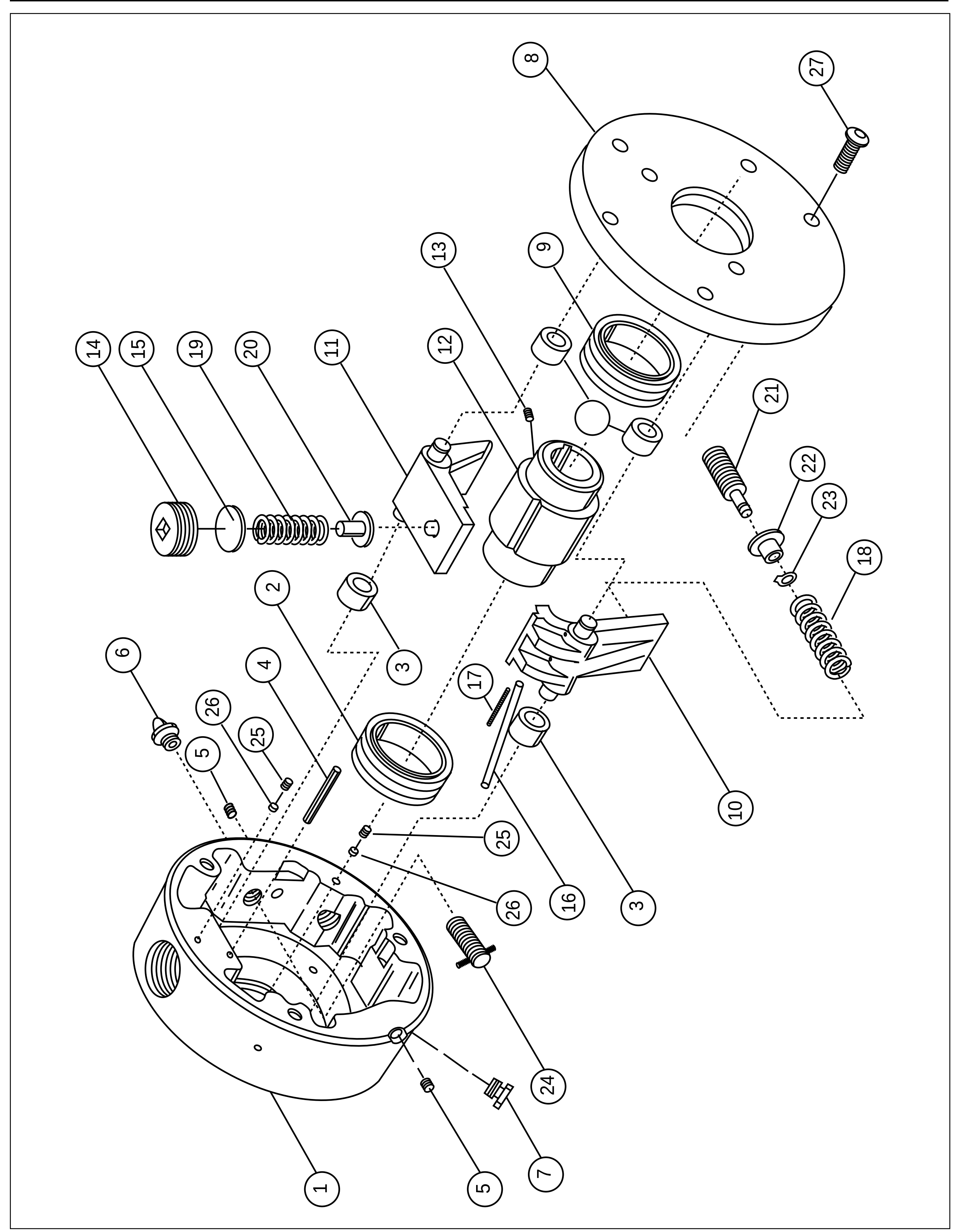


FIGURE 18

3. Turn the drive spring screw (21) clockwise until it is flush with the surface of the housing.
4. The clutch is supplied with a torque selector dial. The torque selector dial is the mill marks located at the hole stamped 9 on the housing. If a drive spring (18), reset spring (19), and/or a reset spring screw (14) were replaced, chances are that the stamped torque values on the dial are no longer valid. It may be necessary to grind the old numbers off and to stamp new ones.
5. Tighten the reset spring screw (14) until it reaches the limit stop pin (4). This will be the maximum torque position. If the maximum torque is not desired, tighten the reset spring screw to one of the locations on the torque selector dial.
6. Disengage the clutch with a torque wrench. Fine tune the torque by turning the drive spring screw (21) until the desired release torque is obtained.
7. Refer to Section I, C for further details on torque adjustment.
8. Once the desired release torque is obtained, tighten the locking screws (25) located over the drive spring and reset spring screws to ensure that they will not move. The unit is now ready for installation. Refer to Section lll for installation of basic clutch.

D. Limit Switch Actuating Mechanism (LSAM) Assembly

1. Apply a graphite lubricant to the release ring groove of the cover (8).
2. Insert the actuating stud (40) through the appropriate hole in the release ring (35). To identify this hole place the release ring in the groove of the cover. When the trip pin holes line up with the through holes of the cover, the actuating stud hole will line up with the counterbored hole in the groove of the cover.
3. Install the actuating stud nut (39) onto the actuating stud (40) and tighten.
4. Install a spring terminal (43) on each end of the return spring (38). Clutch sizes 5 & 6 require two return springs.
5. Insert a spring terminal screw (41) through the hole of the spring terminal (43), and place a spacer collar (36) on the end of the screw. Insert the end of the screw into the threaded hole of the release ring (35) and tighten. The end of the screw may protrude past the release ring. Grind the end of the screw flush with the surface of the release ring. Install second spring terminal screw on clutch sizes 5 & 6 as just described. Move to Step 13 for clutch sizes 5 & 6.
6. Press the trip pins (32) into the trip plate (31).
7. Install a bowed snap ring (34) into the groove of each trip pin located next to the trip plate.
8. Place the trip plate flat on a table with counterbored holes facing up. Insert the thrust springs (37) into the counterbores.
9. Place the cover (8) over the trip plate, lining up the counterbores in the cover with the springs.
10. Place the release ring (35) into the groove of the cover. Make sure that all of the holes line up properly.
11. Insert a spring terminal screw (41) through the hole of the other spring terminal (43) and place a spacer collar (36) on the end of the screw. Insert the end of the screw into the tapped hole of the cover and tighten.
12. Push down on the cover and release ring until the release ring engages into the grooves of the trip pins. Install two snap rings (33) into the grooves of each trip pin. Move to Step 22.
13. Place the release ring (35) into the groove of the cover. Make sure that all of the holes are properly aligned.
14. Insert the trip pins (32) through the matching holes in the release ring (35) and cover (8). Make sure that the tapped hole of the trip pin is inserted first.
15. Slide the release ring (35) counterclockwise so that the ring engages into the grooves of the trip pins.
16. Insert a spring terminal screw (41) through the other spring terminal (43) and place a spacer collar (36) on the end of the screw. Insert the screw into the tapped hole in the cover and tighten. Repeat this process for the other return spring .
17. Turn the cover over so that the release ring is facing down against the surface of the table.
18. Insert the thrust springs (37) into the counterbores of the cover.
19. Place the trip plate (31) over the cover making sure that the springs will sit in the counterbores of the trip plate and that all the holes properly line up.
20. Press down on the trip plate (31) until it stops against the trip pins.
21. While pressing down on the trip plate (31) insert the plate mounting screws (42) into the tapped holes of the trip pins and tighten.
22. Press the cover assembly onto the housing assembly (1). Make sure that the trunnion holes and the mounting screw holes line up.
23. Install the cover screws (27) and tighten to the recommended seating torques shown in Table 13.



ORC SERIES, MODEL S WITH LIMIT SWITCH PIN (LSAP) TYPES SA & SM

PART IDENTIFICATION - MODEL S WITH LIMIT SWITCH PIN (LSAP) TYPES SA & SM

Key No.	Name	Size 1 (Qty.)	Size 2 (Qty.)	Size 3 (Qty.)	Size 4 (Qty.)	Size 5 (Qty.)	Size 6 (Qty.)
*1	T Housing Ass'y., or	711257-XXX (1)	711148-XXX (1)	711180-XXX (1)	711223-XXX (1)	711238-XXX (1)	711266-XXX (1)
	B Housing Ass'y.,or	711258-XXX (1)	711149-XXX (1)	711181-XXX (1)	711224-XXX (1)	711239-XXX (1)	711267-XXX (1)
	C Housing Ass'y.,or	711259-XXX (1)	711150-XXX (1)	711182-XXX (1)	711225-XXX (1)	711240-XXX (1)	711268-XXX (1)
	N/R Housing Ass'y,	711260-XXX (1)	711151-XXX (1)	711183-XXX (1)	711226-XXX (1)	O/A	O/A
2	Housing Bearing	039273-041 (1)	039273-043 (1)	039273-044 (2)	039273-038 (1)	711900-006 (1)	711900-008 (1)
3	Hardened Bushing	—	730634-002 (2)	730634-003 (2)	730634-004 (2)	730634-005 (2)	—
4	Limit Stop Pin	730422-001 (1)	730422-001 (1)	730422-002 (1)	730422-002 (1)	730422-003 (1)	730422-003 (1)
5	Access Screws	040940-031 (2)	040940-042 (2)	074102-003 (2)	074102-078 (2)	074102-078 (2)	040940-078 (2)
6	Grease Fitting	034186-029 (1)	034186-029 (1)	034186-029 (1)	034186-029 (1)	034186-029 (1)	034186-029 (1)
7	Relief Fitting	034186-028 (1)	034186-028 (1)	034186-028 (1)	034186-028 (1)	034186-028 (1)	034186-028 (1)
8	CoverAss'y	711261-001 (1)	711146-001 (1)	711185-001 (1)	711219-001 (1)	711242-001 (1)	711269-001 (1)
9	Cover Bearing	039273-040 (1)	039273-042 (1)	039273-045 (1)	039273-038 (1)	711900-005 (1)	711900-007 (1)
3	Hardened Bushing	—	730634-002 (2)	730634-003 (2)	730634-004 (2)	730634-005 (2)	—
10	Drive Pawl	730429-001 (1)	730430-001 (1)	730431-001 (1)	730432-001 (1)	730433-001 (1)	730434-001 (1)
*11	Reset Pawl	730367-XXX (1)	730368-XXX (1)	730369-XXX (1)	730370-XXX (1)	730371-XXX (1)	730372-XXX (1)
12	Rotor Assembly	710354-001 (1)	710354-002 (1)	710354-003 (1)	710354-004 (1)	710354-005 (1)	710354-006 (1)
13	Rotor Setscrew	043243-012 (1)	043243-022 (1)	043243-041 (1)	** (1)	043243-058 (1)	043243-058 (1)
14	Reset Spring Screw	730382-001 (1)	730382-002 (1)	730382-003 (1)	730382-004 (1)	730382-005 (1)	730382-006 (1)
15	Reset Spring Disc	730383-001 (1)	730383-002 (1)	730383-003 (1)	730383-004 (1)	730383-005 (1)	730383-006 (1)
	LSAP Assembly	710355-001 (1)	710355-002 (1)	710355-003 (1)	710355-004 (1)	710355-005 (1)	710355-006 (1)
16	Actuating Pin	730384-001 (1)	730384-002 (1)	730384-003 (1)	730384-004 (1)	730384-005 (1)	730384-006 (1)
17	Roll Pin	040942-044 (1)	040942-044 (1)	040942-045 (1)	040942-045 (1)	040942-046 (1)	040942-045 (1)
18	A-Drive Spring or	730385-001 (1)	730385-007 (1)	730385-014 (1)	730385-020 (1)	730385-026 (1)	730385-032 (1)
	B-Drive Spring or	730385-002 (1)	730385-008 (1)	730385-015 (1)	730385-021 (1)	730385-027 (1)	730385-033 (1)
	C-Drive Spring	730385-003 (1)	730385-009 (1)	730385-016 (1)	730385-022 (1)	730385-028 (1)	730385-034 (1)
19	A-Reset Spring, or	730385-004 (1)	730385-010 (1)	730385-017 (1)	730385-023 (1)	730385-029 (1)	730385-035 (1)
	B-Reset Spring, or	730385-005 (1)	730385-011 (1)	730385-018 (1)	730385-024 (1)	730385-030 (1)	730385-036 (1)
	C-Reset Spring, or	730385-006 (1)	730385-012 (1)	730385-019 (1)	730385-025 (1)	730385-031 (1)	730385-037 (1)
	D-Reset Spring	—	730385-013 (1)	—	—	—	—
20	Ball Thrust	—	730386-001 (1)	730386-002 (1)	730386-003 (1)	730387-001 (2)	730387-002 (2)
21	Drive Spring Screw	730379-001 (1)	730379-002 (1)	730379-003 (1)	730379-003 (1)	730380-001 (1)	730381-001 (1)
22	Drive Spring Washer	730388-001 (1)	730388-002 (1)	730388-003 (1)	730388-003 (1)	730388-004 (1)	730388-005 (1)
23	Snap Ring	—	040682-029 (1)	040682-030 (1)	040682-030 (1)	040682-030 (1)	040682-031 (1)
24	Reset Screw Ass'y.	710356-001 (1)	710356-002 (1)	710356-003 (1)	710356-004 (1)	710356-005 (1)	710356-006 (1)
25	Locking Screw	074102-015 (2)	074102-015 (2)	074102-031 (2)	074102-031 (2)	074102-027 (2)	074102-027 (2)
26	Locking Insert	730389-001 (2)	730389-001 (2)	730389-002 (2)	730389-002 (2)	730389-003 (2)	730389-003 (2)
27	Cover Screw	041315-048 (3)	041315-062 (3)	041315-077 (3)	041315-106 (4)	041315-121 (4)	041315-021 (4)

*Dash Numbers Are:	SA/SB/SC Automatic	SM/SP/SS Manual
T Housing Ass'y.	-001	-002
B Housing Ass'y.	-001	-002
C Housing Ass'y.	-001	-002
N/R Housing Ass'y.	-001	-002
Reset Pawl	-001	-003

**Dependent upon bore—consult the factory.

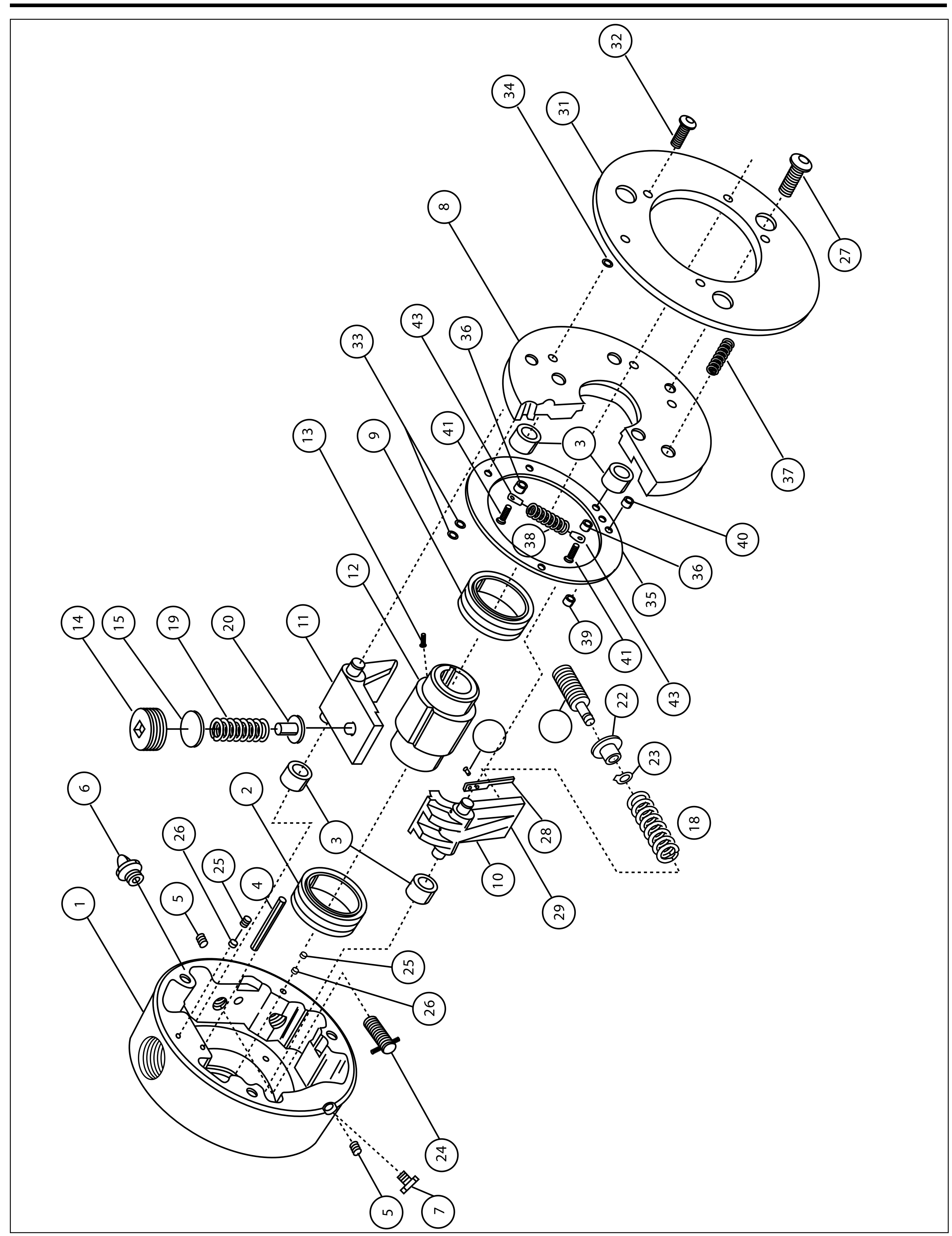
Note:

Please include clutch catalog number when ordering any spare parts.

CAUTION!

Rotating equipment is potentially dangerous and could cause injury or damage if not properly protected. Follow all

In accordance with our established policy to constantly improve our products, the specifications contained herein are subject to change without notice.



ORC SERIES, MODEL S WITH LIMIT SWITCH ACTUATING MECHANISM (LSAM) TYPES SB, SC, SP & SS

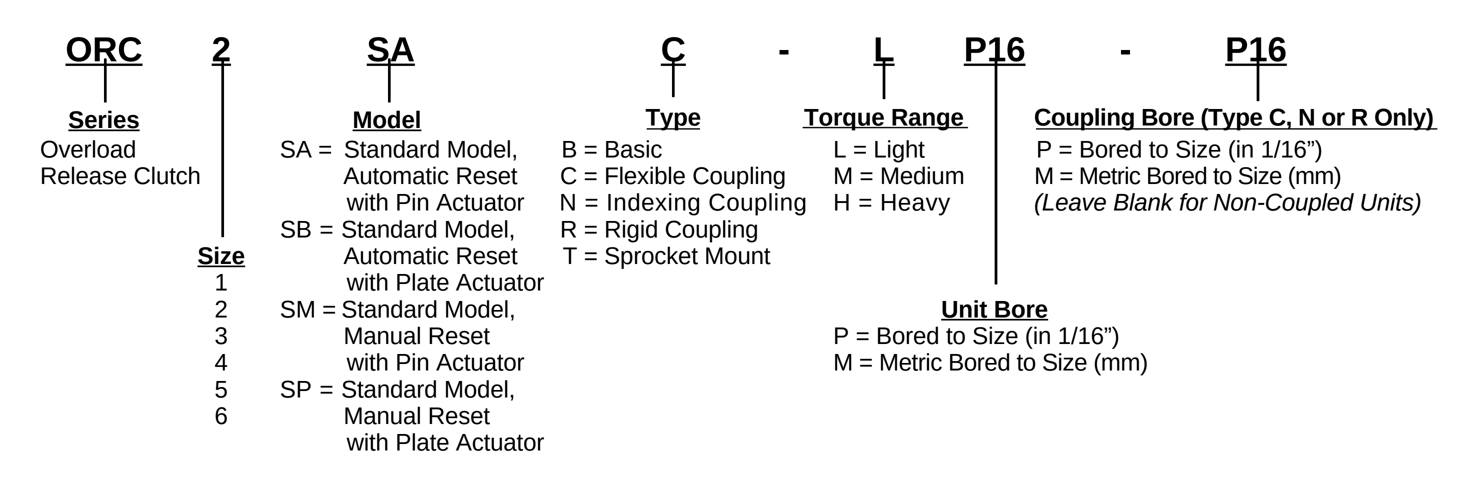
ORC SERIES, MODEL S CLUTCHES

PART IDENTIFICATION - MODEL S WITH LIMIT SWITCH ACTUATING MECHANISM (LSAM) TYPES SB, SC, SP & SS

Key No.	Name	Size 1	(Qty.)	Size 2	(Qty.)	Size 3	(Qty.)	Size 4	(Qty.)	Size 5	(Qty.)	Size 6	(Qty.)
8	Cover Ass'y. (LSAM)	711262-001	(1)	711187-001	(1)	711108-001	(1)	710766-001	(1)	711190-001	(1)	711270-001	(1)
9	Cover Bearing	039273-040	(1)	039273-042	(1)	039273-045	(1)	039273-038	(1)	711900-005	(1)	711900-007	(1)
3	Hardened Bushing	—		730634-002	(2)	730634-003	(2)	730634-004	(2)	730634-005	(2)	—	
10	Drive Pawl (LSAM)	710290-001	(1)	710291-001	(1)	710292-001	(1)	710293-001	(1)	710294-001	(1)	710295-001	(1)
28	Actuating Spring	730414-001	(1)	730415-001	(1)	730416-001	(1)	730417-001	(1)	730418-001	(1)	730419-001	(1)
29	Adjustment Screw	018006-004	(1)	018006-017	(1)	018006-047	(1)	018006-047	(1)	018006-047	(1)	018006-047	(1)
30	Mounting Rivet/Screw	730420-001	(2)	730420-001	(2)	730420-002	(2)	730420-002	(2)	730420-002	(2)	074110-018	(2)
	Plate Ass'y (SB/SP), or	710204-001	(1)	710205-001	(1)	710206-001	(1)	710207-001	(1)	—		—	
	Plate Ass'y (SC/SS)	710204-002	(1)	710205-002	(1)	710206-002	(1)	710207-002	(1)	—		—	
31	Plate (SB/SP), or	730397-001	(1)	730398-001	(1)	730399-001	(1)	730400-001	(1)	730401-001	(1)	730402-001	(1)
	Plate (SC/SS)	730397-002	(1)	730398-002	(1)	730399-002	(1)	730400-002	(1)	730401-002	(1)	730402-002	(1)
32	Trip Pin	730403-001	(3)	730404-001	(3)	730405-001	(3)	730406-001	(4)	730407-001	(4)	730408-001	(4)
33	Snap Ring	040682-035	(6)	040682-035	(6)	040682-036	(6)	040682-030	(8)	—		—	
34	Bowed Snap Ring	040682-032	(3)	040682-032	(3)	040682-033	(3)	040682-034	(4)	—		—	
35	Release Ring	730391-001	(1)	730392-001	(1)	730393-001	(1)	730394-001	(1)	730395-001	(1)	730396-001	(1)
36	Spacer Collar	730409-001	(2)	730409-002	(2)	730409-002	(2)	730409-002	(2)	730409-002	(4)	730409-002	(4)
37	Thrust Spring	730410-001	(3)	730410-002	(3)	730410-002	(3)	730410-002	(4)	730410-002	(4)	730410-003	(4)
38	Return Spring	730411-002	(1)	730411-001	(1)	730411-002	(1)	730411-001	(1)	730411-002	(2)	730411-001	(2)
39	Actuating Stud Nut	730412-001	(1)	730412-002	(1)	730412-003	(1)	730412-004	(1)	730412-004	(1)	730412-004	(1)
40	Actuating Stud	074111-126	(1)	074111-126	(1)	730413-001	(1)	730413-002	(1)	730413-002	(1)	730413-002	(1)
41	Terminal Screw	074110-003	(2)	074110-017	(2)	074110-017	(2)	074110-017	(2)	074110-017	(4)	074110-017	(4)
42	Plate Mounting Screw	—		—		—		—		730561-001	(4)	730561-002	(4)
43	Spring Terminal	730421-001	(2)	730421-002	(2)	730421-002	(2)	730421-002	(2)	730421-002	(4)	730421-002	(4)
	C Coupling Ass'y.	710296-001	(1)	710297-001	(1)	710298-001	(1)	710299-001	(1)	O/A		O/A	
	Coupling Bushing	730275-001	(3)	730275-002	(3)	730275-003	(4)	730275-004	(4)	—		—	
	Setscrew	040940 041	(2)	040940-003	(2)	040940-003	(2)	040940-067	(2)	—		—	
	Coupling Pin	730278-001	(3)	730278-002	(3)	730278-003	(4)	730278-004	(4)	—		—	
	N/R Coupling Ass'y.	710301-001	(1)	710302-001	(1)	710303-001	(1)	710334-001	(1)	O/A		O/A	
	Mounting Screw	074118-062	(3)	074118-077	(3)	074118-093	(4)	074118-110	(4)	—		—	
	Flat Washer	074117-004	(3)	074117-006	(3)	074117-009	(4)	074117-013	(4)	—		—	
	Setscrew	040940-041	(2)	040940-003	(2)	040940-003	(2)	040940-067	(2)	—		—	

Note:
Please include clutch catalog number when ordering any spare parts.

ORC MODEL S SERIES PART NUMBERING SYSTEM



COUPLINGS

Boston Gear
14 Hayward Street
Quincy, MA 02171
Tel 617.328.3300
fax 617.479.6238
www.bostongear.com

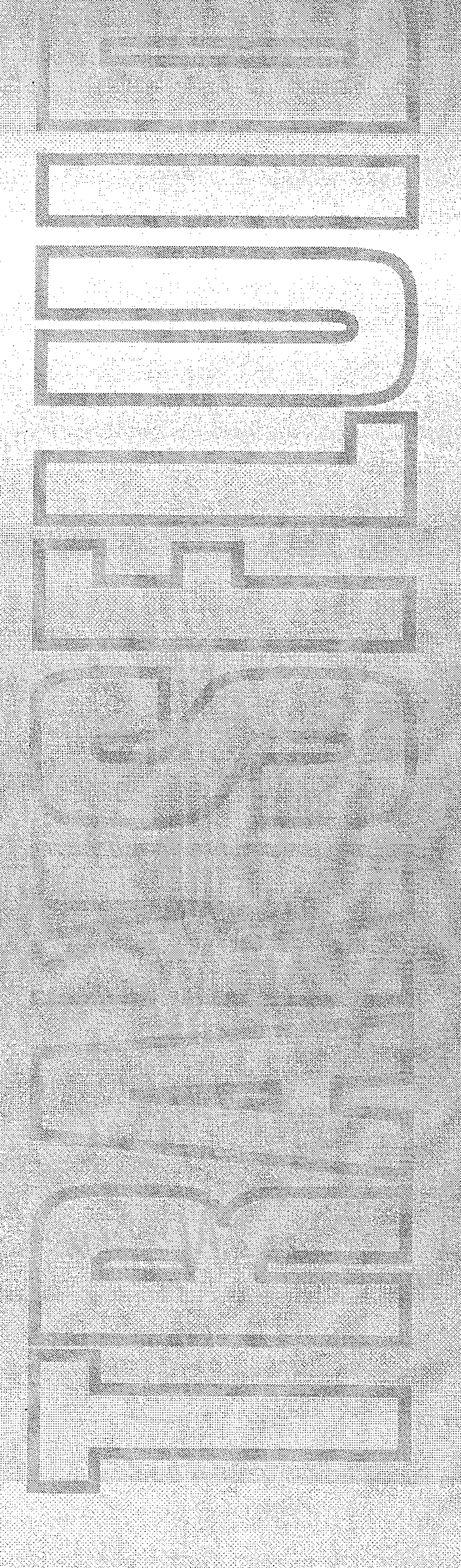
CLUTCHES

Boston Gear
14 Hayward Street
Quincy, MA 02171
Tel 617.328.3300
fax 617.479.6238
www.bostongear.com



Boston Gear
14 Hayward St.
Quincy, MA 02171

tel 617.328.3300
fax 617.479.6238
www bostongear.com
email info@bostongear.com



TRANSFLUID

industrial transmissions

INSTALLATION AND MAINTENANCE

BEFORE ASSEMBLING AND OPERATING THE FLUID COUPLING, CAREFULLY READ ALL THE SAFETY AND OPERATING INSTRUCTIONS REPORTED IN THIS MANUAL.

ALWAYS FOLLOW ALL THE INSTRUCTIONS AND ASSURE THAT ALL THE OPERATORS STANDING BY THE MACHINERY ARE WEARING ALL THE PROTECTIVE EQUIPMENT NECESSARY FOR THE JOB TYPE AND APPLICATION BEING PERFORMED.

DO NOT USE THE MACHINERY IF YOU DO NOT UNDERSTAND THESE INSTRUCTIONS, AND IMMEDIATELY REFER TO THE MANUFACTURER OR THE CUSTOMER SERVICE DESK FOR ASSISTANCE.

THE COUPLING MUST BE PROTECTED BY A CONVENIENT COVER GUARD TO AVOID PERSONAL INJURY TO PEOPLE.
AXIAL AND RADIAL VENTILATION OPENINGS SHOULD BE INCORPORATED IN THE GUARD FOR HEAT EXCHANGE.

IF THE COUPLING IS FITTED WITH FUSIBLE PLUGS, THE SAID OPENINGS SHOULD NOT BE DIRECTED TOWARDS OPERATORS OR ANY HOT OR ELECTRICAL INSTALLATION.

KRAFT
The power of performance.

drive with us

FLUID COUPLINGS
...KR..., ...KS..., EK



1 - INSTALLATION

KR – KSD series and derived couplings

1.1 For the **KRG** coupling, remove the coupling half (pos. 29 – Fig. 3)
1.2 Check that the electric motor shaft or gear reducer (reverse mounting) is equipped with threaded hole according to dimensions indicated in Tab. **B.** If that is so proceed as indicated below.
1.3 Key the fluid coupling on the shaft using a threaded bar **Q** as indicated in Fig. **1**, and using two wrenches: a to avoid the shaft rotation, **b** to key the coupling on the shaft.
For proper installation lubricate the shafts with an anti-seizing paste.
1.4 If the shaft is not threaded as indicated in 1.2, the coupling shaft can be warmed to 195 °F to help facilitate the installation.
We suggest a slight press fit, in order to avoid difficulties during the subsequent de-installation.

(only for **...KRG** and derived couplings)
1.5 Tighten the two set screws (Fig. 1 – pos. 62, dimension S, Tab. **B**)
1.6 Install the half coupling pos. 29 (Fig. 3) on the machine shaft and make sure its end doesn't stick out beyond **x.**
1.7 Lock the driven shaft from rotation. Advance the fluid coupling so that the two coupling halves interface leaving the gap **k**. Use a feeler gauge check at every 90° to assure that the radial and angular misalignments are within the limit on Tab. **A.**

(only for **...KSD** with cylindrical hole and key-way)
1.8 Install the fixing bolt and washer pos. 26-27. Tighten to the locking torque values found in Tab. **B.**

(only for **...KSD-QD** with taper bush)
1.9 Remove the key from the motor shaft and replace with a special key **T** type.
1.10 Clean carefully from oil, grease etc. (if possible with solvent) the friction connecting surfaces between coupling and adapter collet and between adapter collet and motor shaft (or gear reducer).
1.11 Install the collet on the shaft using a screwdriver in one of the axial slits to facilitate the installation. The bush is installed against the shoulder.
1.12 Mount the pulley per the manufacturer's directions. Slide the fluid coupling over the adapter collet. Install the fixing bolt and washer. Lock the fluid coupling shaft C with wrench B and tighten the fixing bolt (pos. 26a and 27a). Using a torque wrench, tighten the fixing bolt to the locking torque values found in Tab. **B.**

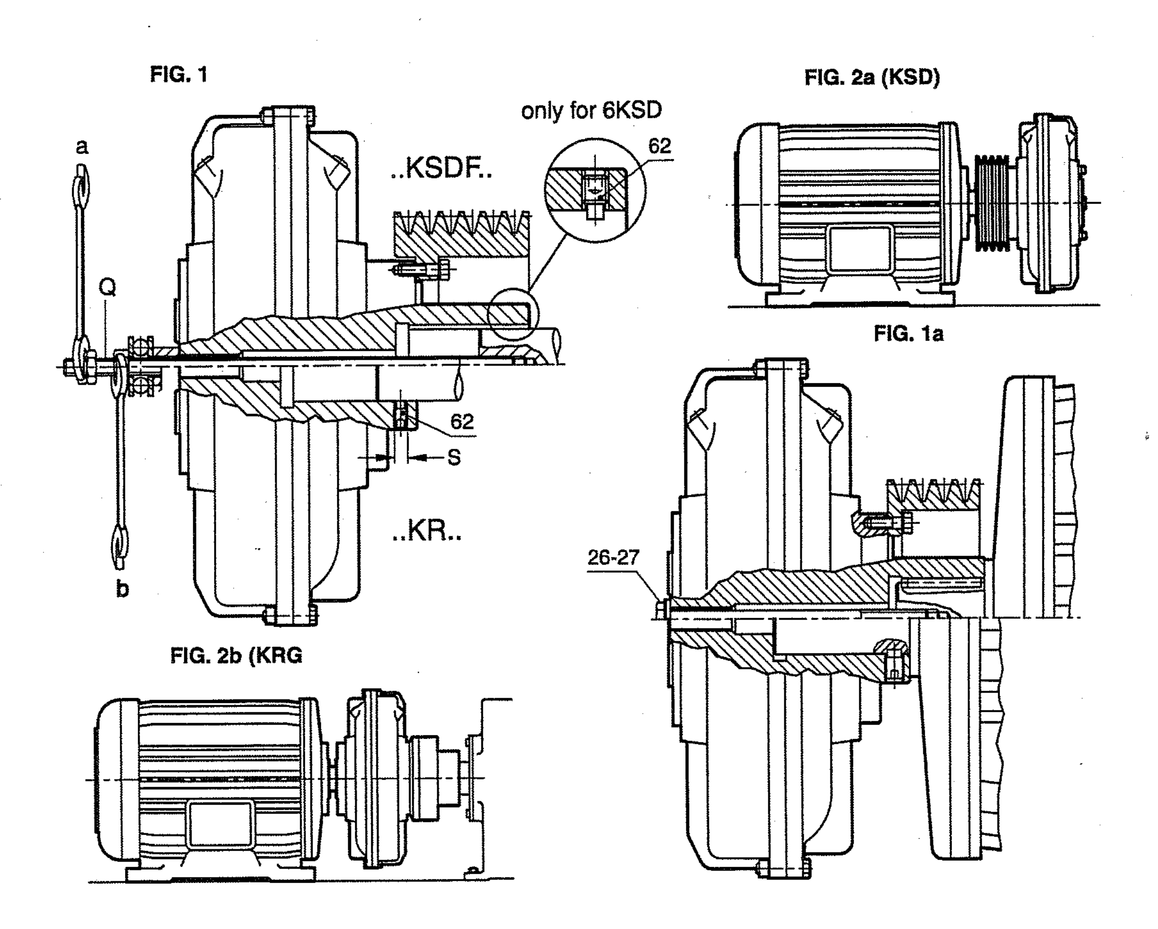


FIG. 2 FIG. 2a

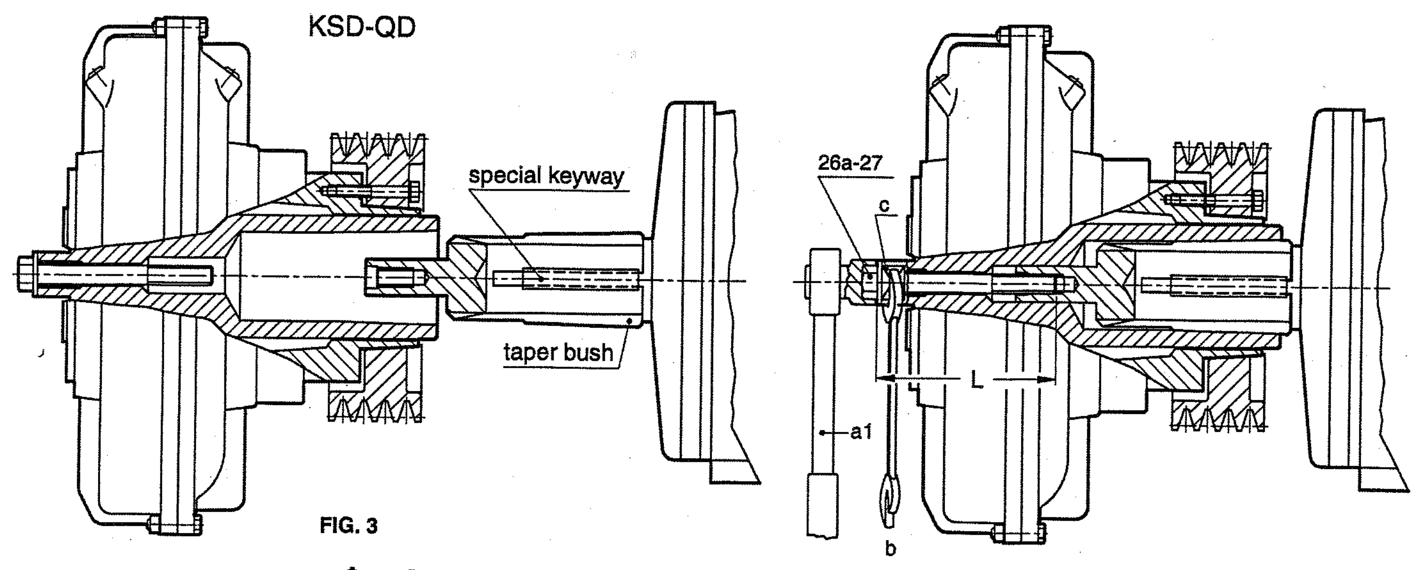
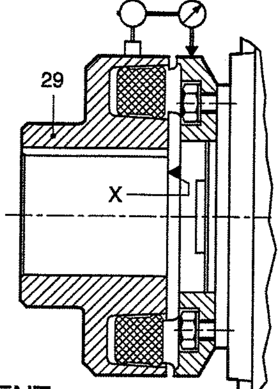


FIG. 3



Tab. A

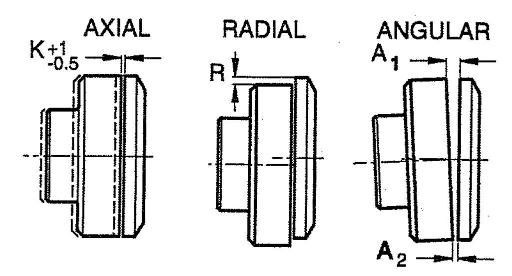
...KRG	elastic coupling BT	dimensions mm K	R	A1-A2
6	02	2	0.2	0.3
7-8	10		0.3	0.4
9-11-12	20		0.35	
13	30	3	0.4	0.6
15	40			
17-19	50		0.5	
21-24	60			0.8
27-29	80	4	0.6	
34	90	5		

Tab. B

SIZE	... KSD locking torque Pos. 26 bolt	lb-ft	pos. 26a bolt	L	lb-ft	... KR... Pos. 62
6	–	–	–	–	–	1/4 20 UNC
7	–	–	3/8 16 UNC	3.34	35	5/16 18 UNC
8				4.00		
9			5/8 11 UNC	5.00	153	7/16 14 UNC
11				5.14		
12				6.00		
13				8.00		9/16 12 UNC
15	3/4 10 UNC	284	3/4 10 UNC	10.00	284	5/8 11 UNC
17-19	7/8 9 UNC	407	7/8 9 UNC		407	3/4 10 UNC
21-24			–	–	–	
27-29-34	–	–	–	–	–	7/8 9UNC

Nm = lb-ft x 1.3558

MISALIGNMENT



EK series (Fig. 5)

1.13 Assemble the flange A of the motor (of the gearbox for 6EK) and tighten bolts D.
1.14 Install the bell housing B onto the gearbox flange (electric motor for 6EK) and tighten bolts E.
1.15 Install the fluid coupling C on the motor shaft, hitting with a soft hammer on the shaft end X, until it reaches the limit of the travel.
1.16 For a correct fitting, it is important to lubricate surfaces with anti-seizing paste.
1.17 Install the coupling / motor assembly into the gearbox hollow shaft as far as the flange A is connected to the bell housing B, then fix the bolts F.
1.18 Install the safety guard G.

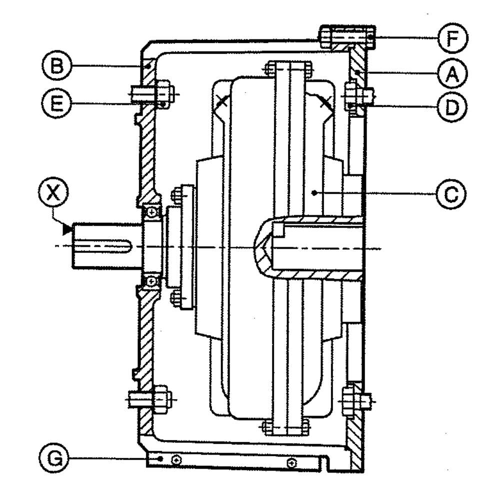
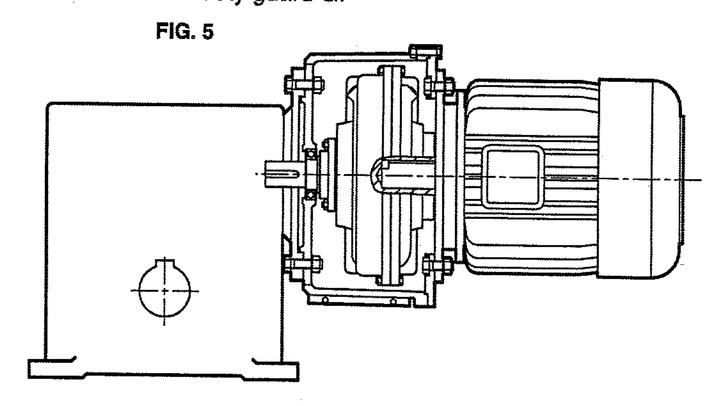


FIG. 5



KRM series (Fig. 4a)

1.19 Mount the fluid coupling as instructed in Paragraphs 1.1 to 1.7.
1.20 Install the hub (item 29a) on the driven shaft and lock the driven shaft from rotation. Mount the motor to assure dimension **S** (Tab. **C1**) between the hub (pos. 29a) and the flange 27a.
1.21 Using a dial indicator check at every 90° to assure that the radial and angular misalignment are within the limits on Tab. **C1**.
1.22 Install the rubber elements (pos. 28a) with the bolts (pos. 59). Tighten the bolts to the locking torque listed in Tab. **C1**.

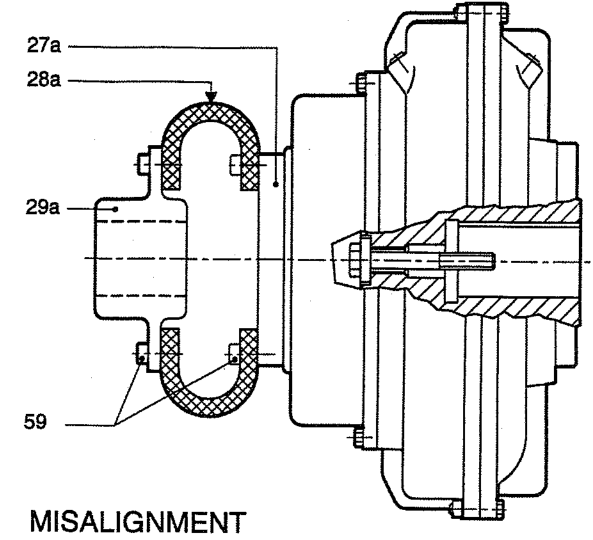
Tab. C1

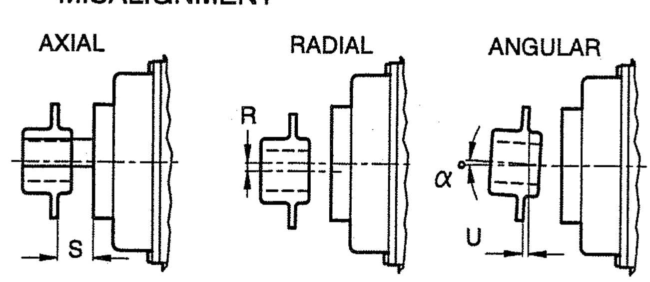
...KRM	Elastic coupling MCF..FF	Alignment tolerances (mm)			
		S	U	α°	R
9-11-12	53	75 ± 1	1.5	0.75	0.6
13	55			0.5	
15	56				
17-19	58			0.4	
21-24	65	116 ± 1.5	2.0	0.5	1.0
27	66			0.4	
29	68			0.3	
34	610				

Screw item 59	Locking torque lb-ft
M6	7.5
M10	37

Nm = lb-ft x 1.3558

FIG. 4a





KRA series (Fig. 4b)

1.23 Mount the fluid coupling as instructed in Paragraphs 1.1 to 1.7.
1.24 Install the hub (pos. 29b) on the driven shaft and lock the driven shaft from rotation.
1.25 Install the elastic element (item 28b) on the hub (item 29b). Tighten screws (item 60) according to the locking torque listed in Tab. **C2**.
1.26 Mount the motor to assure surface **Z** is spaced from surface **Y** by dimension **S** in Tab **C2**.
1.27 Using a dial indicator and feeler gauges check at every 90° to assure that the radial and angular misalignment are within the limits on Tab. **C2**.
1.28 Install the elastic element to the fluid coupling with the threaded pins (pos. 61).

N.B.: Radial screws (item 60) and axial threaded pins (item 61) must be locked at the prescribed torque reported in Tab. C2. by using a torque wrench.
Insufficient locking torques will inevitably lead to the loosening of the bolts during operation, and to the consequently rapid failure of the elastic element.
In case it is not already present on the fixing screws or pins, always use a threaded sealant (medium type).

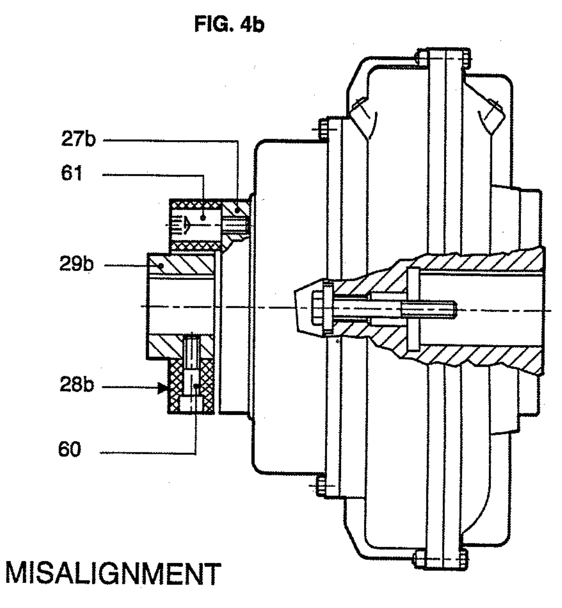
Tab. C2

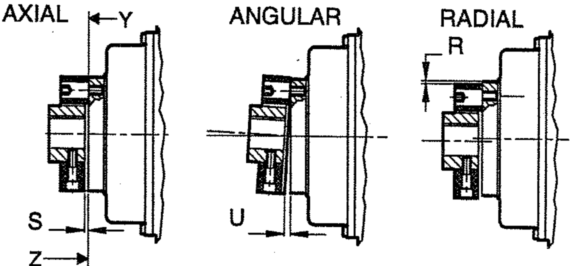
...KRA	Elastic coupling	Alignment tolerances (mm)		
		S	U	R
7-8	8A-1S	4 ± 1.5	1	0.6
9-11	16A-1S	6 ± 2		
12	25A-1S		1.5	
13-15	50A-1S	8 ± 2		1.0
17-19	140A-1S		2.0	
21-24	250A-1S			

Screw item 60-61	elastic coupling MCF..FF
M10	37
M12	66.5
M14	103
M16	162
M20	369

Nm = lb-ft x 1.3558

FIG. 4b







2. FLUID COUPLING FILLING INSTRUCTIONS

KR – KSD - EK series

Transfluid fluid coupling are not supplied with oil.
It is necessary to perform the following procedure.

2.1 With the coupling mounted (Fig. 6) rotate it till the X cast into the housing is at the 12 O'clock position. This will put the fill plug pos. 13 at the correct angle for the maximum fill level.

2.2 Fill the coupling till oil drains from the filler hole. It is useful to gentle rock the coupling back and forth to purge trapped air and removing the pipe plug found on the cover. This will aid in venting the coupling.

2.3 Reinstall the plug using a quality thread sealant. The plug torque values can be found in Tab. **E**.

2.4 The fillings marked X-1-2-3-4 may be chosen by the operators to meet the best performance in terms of start-up and steady running operation.
With the maximum fill X a condition of minimum slip and maximum performance is achieved: the starting torque / nominal torque ratio gets higher (value generally comprised between 1.8 and 2.0); decreasing the oil quantity inside the coupling (fill 1-2-3-4), the opposite result is obtained.

2.5 High slip causes overheating of oil contained in the working circuit, with a consequent decrease in overall performance.

2.6 For normal operating conditions, use only **ISO HM 32** (or equivalent **SAE 10W**) oil types listed in Tab. **D**. At low ambient temperatures (near 0 °C), it is recommended to use **ISO FD 10** (or equivalent **SAE 5W**) oil. For temperatures below –10 °C, ask Transfluid.

2.7 For vertical mounted applications, the coupling recommended oil fills are reported in Tab. **D1**.

Tab. D - Fluid recommendation

Coupling operating temperature	
Above 160 °F	**Below 160 °F**
SAE 10W Non-Detergent	SAE 5W Non-Detergent

CKR.../CCKR... – CKSD.../CCKSD... series

Fluid couplings with delayed fill chamber (CK/CCK series) have been designed to reduce the starting torque/nominal torque ratio to value of less than 1.6. By enlarging the delay chamber to the CK/CCK series this ratio can be improved to 1.3.

2.8 The starting torque limitation can be achieved by reducing the oil quantity into the working circuit (fill 2-3-4) without increasing the slip value at rated speed. In standstill position, the delayed fill chamber contains part of the oil fill that flows to the working circuit during start-up.

2.9 The oil passes from the delayed fill chamber to the working circuit through **calibrated orifices** (Fig. 7) by centrifugal force. Starting from size **15CK/CCK**, such orifices diameters can be modified even when the coupling is already assembled, simply by replacement of the whole valve (size 15 - 17 and 19) or by replacement of the **calibrated bleed plug** only (pos. b). tightened into the valve pos 57 (larger sizes). When reassembling the valve, always remember to fit the copper seal (item 58). Tighten screw with torque indicated in Tab. **E**. Then inspect for leakage.
This technical solution allows a very simple and easy operation, to be achieved in a very short time and (what is more important) without disassembling the fluid coupling.

2.10 For each starting torque / nominal torque ratio, Transfluid can give the exact oil fill. The fluid coupling with a delayed fill chamber are generally to use with **fill 2** (Tab. **D2**), while the couplings equipped to use a double delayed fill chamber with **fill 3** (Tab. **D3**).
As fluid couplings are supplied without oil, follow the instructions reported at par. 2.1 - 2.2 - 2.3 - 2.6.

2.11 For vertical mounted applications, the couplings recommended oil fills are reported in Tab. **D2** and **D3**. Due to delayed fill chamber peculiarity, for vertical mounting the chamber must be downward.

Tab. D1

	OIL QUANTITY (lt.)				
K...	**X**	**1**	**2**	**3**	**4**
6	0.505	0.480	0.455	0.425	0.390
7	0.920	0.860	0.800	0.730	0.650
8	1.510	1.405	1.295	1.190	1.080
9	1.950	1.820	1.690	1.550	1.400
11	2.750	2.550	2.350	2.100	1.850
12	4.100	3.875	3.575	3.250	2.900
13	5.200	4.850	4.450	4.050	3.600
15	7.650	7.150	6.600	6.000	5.400
17	11.70	10.90	10.00	9.100	8.200
19	14.20	13.30	12.30	11.20	10.00
21	19.00	17.80	16.40	15.0	13.50
24	28.40	26.50	24.60	22.60	20.50
27	42.00	39.00	36.00	33.50	31.50
29	55.00	51.00	47.00	44.00	41.50
34	82.50	76.60	70.60	66.20	62.50

Gal. = lt x 0.2642

Tab. D2

	OIL QUANTITY (lt.)		
CK...	**2**	**3**	**4**
11	3.350	3.050	2.750
12	4.800	4.200	3.600
13	5.800	5.200	4.700
15	8.600	7.700	6.400
17	13.60	12.80	11.70
19	16.50	15.20	14.00
21	23.00	21.30	19.30
24	31.20	28.60	26.00
27	50.00	46.50	43.00
29	63.00	59.00	54.00
34	92.50	88.50	83.50

Gal. = lt x 0.2642

Tab. D3

	OIL QUANTITY (lt.)	
CK...	**3**	**4**
15	9.30	8.00
17	16.36	14.86
19	18.76	16.86
21	27.30	24.30
24	35.43	31.63
27	59.35	55.15
29	70.60	65.20
34	96.70	86.40

Gal. = lt x 0.2642

FIG. 6

Tab. E

SIZE	FUSIBLE PLUG		
	N 7018..	Torque (lb-ft)	D. nom
6	AB	8.9	1/8"
7-8-9 11-12	BB	17	1/4"
13-15 17-19 21-24	CB	21.4	3/8"
27-29 34	DB	32	1/2"

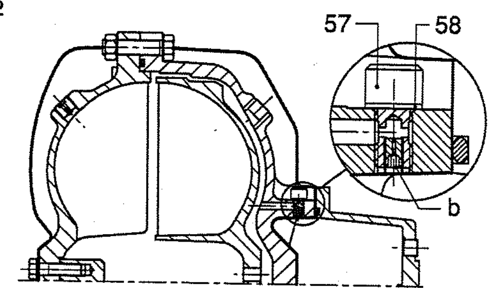
Nm = lb-ft x 1.3558

Tab. E

SIZE	VALVE Item 57	
	Dia	Torque (lb-ft)
15 17-19	M10	11
21-24 27-29 34	M12	14.8

Nm = lb-ft x 1.3558

FIG. 7



3. OPERATION AND MAINTENANCE

3.1 The normal operating procedures must be followed to keep balance and temperature under control.
To not damage the coupling seals, temperature must not exceed 195 °F values; all the seals have to be made of a special material and the rotating ones in **Viton** (item 15 and 20).
As evidenced in Tab. **F** where the causes and the relevant remedies are reported, a high temperature value may be caused by the following conditions:
a) Insufficient oil fill
b) Higher absorbed power than motor rated power
c) High ambient temperature
d) High starting frequency per hour
e) Excessive starting time
f) Too many consecutive start-ups
g) Inadequate air ventilation due to cover guard

Transfluid can supply all operating data upon request.

3.2 After the first 20 days operation, check the oil fill **(this operation to be carried out with cold oil)**, the tightening of the screws, the motor and the driven machine.

3.3 Repeat the above checks every 6 months. For the KRG models, check the gap **K** (Tab. **A**) of the elastic coupling. If the torsional gap is excessive (about 2°), replace the rubber elements.

3.4 Fluid couplings are supplied with fusible plug at 140 °C (120 °C and 198 °C settings are available upon request) as shown in Fig. 14.
If the fusible plug blows at regular intervals during normal service check a), f) in par. 3.1, and relevant Tab. **F** should be considered.

3.5 In case the switching pin or the electronic overload controller are mounted, check that the distances shown in Fig. 9 and 11 are within the values imposed during the assembly phase.

3.6 Oil should be replaced after 4000 hours operation.

Tab. G

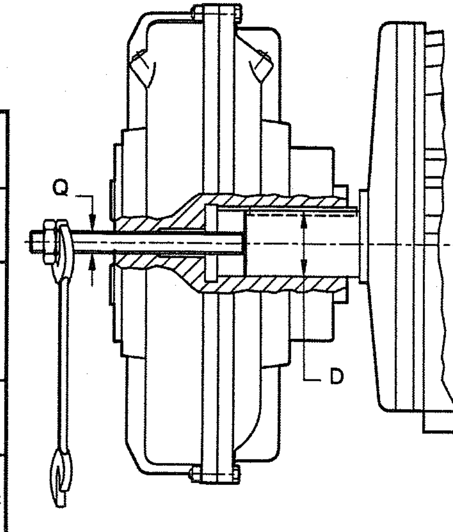
K.../CK	D mm	D inch	Q KR	Q KSD
7-8	34.925	1.375	1/2 13UNC	1/2 13UNC
	28.575	1.125		
	22.225	0.875		
9-11-12	47.625	1.875	3/4 10UNC	3/4 10UNC
	41.275	1.625		
	34.925	1.375		
13	60.325	2.375	7/8 9UNC	
	53.975	2.125		
15	73.025	2.875		7/8 9UNC
	60.325	2.375		
	53.975	2.125		
17-19	85.725	3.375	1 1/4 7UNC	1 1/4 7UNC
	73.025	2.875		
21-24	98.425	3.875		
	85.725	3.375		
27-29	133.35	5.250	1 3/4 5UNC	1 3/4 5UNC
	120.65	4.750		
34	150.8	5.938		

4. DISASSEMBLY

4.1 Disassemble the set screw (item 25) for KR models; fixing screw (item 26 – 26a) for KSD models.

4.2 Screw threaded bar into tapped hole at the end of the fluid coupling and proceed as shown in Fig. 8 The threaded bar (dimensions **Q** reported in Tab. **G**) will push the coupling off the motor shaft.

4.3 For the couplings assembled with a taper bush, a very small displacement is sufficient to disengage the coupling from its seat. In case the taper bushing is to be removed too, a screwdriver may be used to push into the keyway cut.
Do not force the taper bushing to avoid damaging the contact surfaces which may compromise the correct reassembly of the part.



Tab. F

SYMPTOM	CAUSE	REMEDY
TOO HIGH TEMPERATURE FUSIBLE PLUG INTERVENTION	INSUFFICIENT OIL LEVEL	Check level and possibly top off
	TOO MANY CONSECUTIVE START-UPS	Wait for cooling before restarting, or reduce number of start-ups
	HIGHER ABSORPTIONS THAN SPECIFIED ON TAG	Remove causes and/or review motor/coupling dimensioning
	HIGH AMBIENT TEMPERATURE	Improve coupling ventilation
	JAMMED OR OVERLOADED DRIVEN MACHINE	Remove causes and/or review motor/coupling dimensioning
	TOO NEAR HEAT SOURCE	Remove source or introduce a shield
	TOO CLOSE PROTECTION COVER	Introduce convenient air passages to improve heat exchange
PERFORMANCE DECREASE	OIL LEVEL	Check oil level and fill with the right type if necessary
	OIL TYPE SPECIFICATION	Replace if necessary (tab. D of page 4)
		Verify whether using recommended oil specifications
	AMBIENT TEMPERATURE LOWER THAN 0 °C	Use correct oil type (see par. 2.6 at page 4)
INSUFFICIENT OPERATING SPEED AND/OR EXCESSIVE SLIP	FAULTY MOTOR	Check motor rotating speed (if electric, check connections)
	STAR/DELTA INSERTION TIME	If required time is too long, reduce it to 3 s max.
	JAMMED OR BRAKED DRIVEN MACHINE	Remove causes and/or review motor/coupling dimensioning
NOISE AND VIBRATION	ALIGNMENT	Check alignment (page 1 par. 1.7)
	FAULTY BEARINGS	Disassemble, check, replace bearings (and relative seals)
	ELASTIC COUPLING ELEMENT WORN	Substitute worn elements
WHISTLE	PROTECTION COVER	Avoid small air passages between cover and machine

5. ACCESSORIES

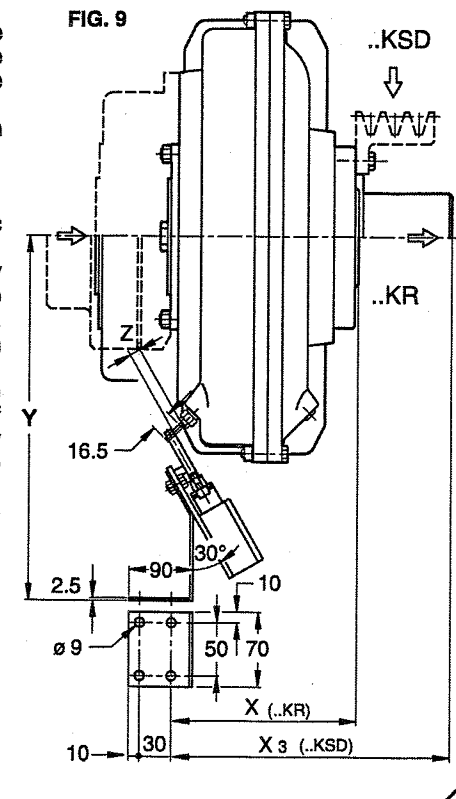
The fluid coupling can be equipped, beyond the standard fusible plug, with safety devices avoiding oil to escape, and that, in the case of the electronic overload controller, can manage a few more parameters too.
The fusible plug is present as an element of further safety, though being set at a higher temperature value.

5.1 SWITCHING PIN (Fig. 9)

This device is made of a fusible plug equipped with a metallic pin inserted in the fusible alloy material of the plug.
In case the intervention temperature is reached, the alloy material melts making the pin free so that it escapes due to the centrifugal force, intercepting the cam of the switch, activating it and supplying the relevant output signal, that can be used as alarm or motor trip.
In case of external impeller as a driver, indicated in Fig. 9 the switching pin operates in every condition, while in case of external impeller as a driven part, it can be activated correctly only in case of increase of the slip due to overload or to excessive absorption.
Install firmly the switch to the base unit according to dimensions X, Y and Z of table G1, taking into account that the pin of the fusible plug, in case of intervention, escapes by 16.5 mm and it shall move the cam of the switch.
It is possible to install this system on all fluid couplings from size 13K even in case it has not been included as initial supply.
For couplings 7K÷12K, switching pins must be installed by TRANSFLUID.
The package includes: percussion fusible plug, gasket, conical plug, glue, instruction for installation.
The electrical connection of the switch shall be realized with voltage not greater than 230 V and current max. 6 A.

NOTE: Regarding dimensions and further details , refer to the relevant supplied instructions (TF6438).

FIG. 9



Tab. G1

DIM.	X	X_3		Y	Z
		(1)	(2)		
7	127	163		262	
8	136	172		272	–
9	158	215	–	287.5	
11	165	221		300.5	
12	175	265.5		323	15
13	192	309		335	16
15	216	343	357	358	16
17	242	425	425	382	12
19	234	417	417	400.5	9
21	282	–	471*	423	8
24	283	–	472*	460	4
27	306			491	9
29	319	–	–	524	8
34	381			584	4

REFERENCE DIMENSIONS
1) KSD-QD for taper bush
2) KSD-KSD/QD for cylindrical hole
*) for diameter Ø 98.425 (3.875) + 40 mm

5.a SWITCHING PIN REACTIVATION (Fig. 10)

5a.1 Unscrew white cover and take pin **A** out together with the scraps of the melted material.
5a.2 Fit the fusible ring **B** on the pin, paying attention to the right choice of the temperature value of the fusible alloy.
5a.3 Insert pin with the fusible alloy into the cap **C**.
5a.4 By means of a tool **D** similar to that shown in the picture, tap the fusible ring in the bottom of the seat.
5a.5 Make sure that the pin is completely seated.
5a.6 Screw the white cover on cap again.

NOTE: The said operation must be performed when the fluid coupling is at ambient temperature.

5.2 ELECTRONIC OVERLOAD CONTROLLER

ELECTRONIC OVERLOAD CONTROLLER formed by a proximity sensor and a speed controller detecting the output speed of the fluid coupling continuously.
When the load torque increases, slip increases and speed consequently decreases.
If the speed reduces down to the set threshold for a longer time than specified, an output signal by the intervention of the internal relay is made.
The controller can be field installed. Only 2 bolts positioned at 180° around the external crown must be replaced (as shown in Fig. 11) with 2 special ones having a longer screw and nut.

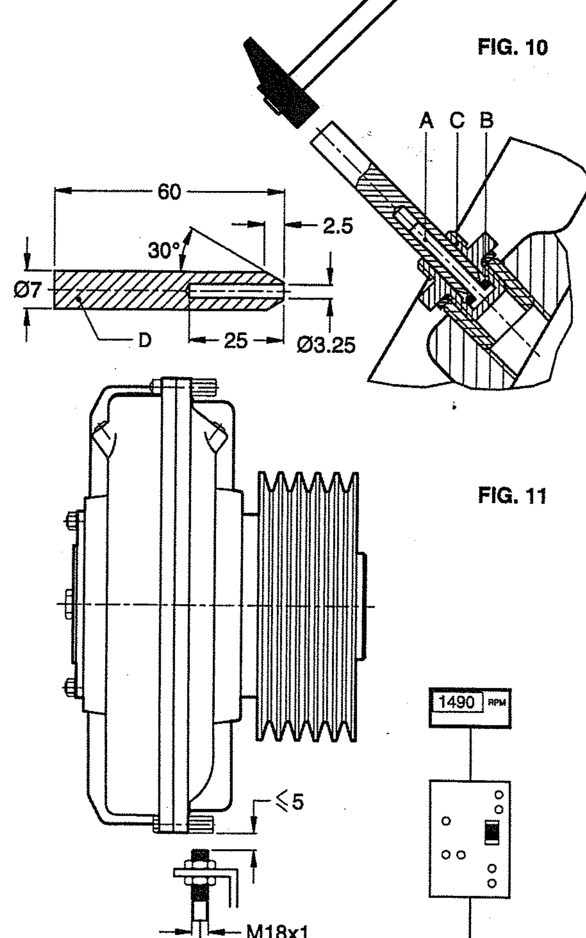


FIG. 10

FIG. 11

5.2 ELECTRONIC OVERLOAD CONTROLLER

As shown in Fig. 11, it is necessary to position the proximity sensor in line with the two bolts at 180°, at a distance less than 5 mm, while the controller can be fitted in the most convenient place, chosen by the user, within a maximum distance of 20 m (making the proximity connection wire adequately longer).
Before connecting to the electrical power supply, always verify the voltage.
The electrical connections must be made according to the schematic shown in the detailed instructions of the electronic device, setting and/or adjusting all the functions on the control panel, as shown in Fig. 12:

a) Blind time for starting **TC**, with a screw regulation up to 120 s, avoiding the intervention of the alarm during the starting phase.
b) Speed range **DS**, by means of a Dip-Switch to be programmed on 5 and 8 positions, setting relay condition, proximity type, reset system, acceleration or deceleration.
c) Speed threshold **SV** to be screw regulated from 1 to 10.
d) Reset **R**, locally executable with a manual switch or remote connections.
e) Delay time **T** setting screw regulation up to 30 s. This function delays possible alarms caused by sudden torque variations.

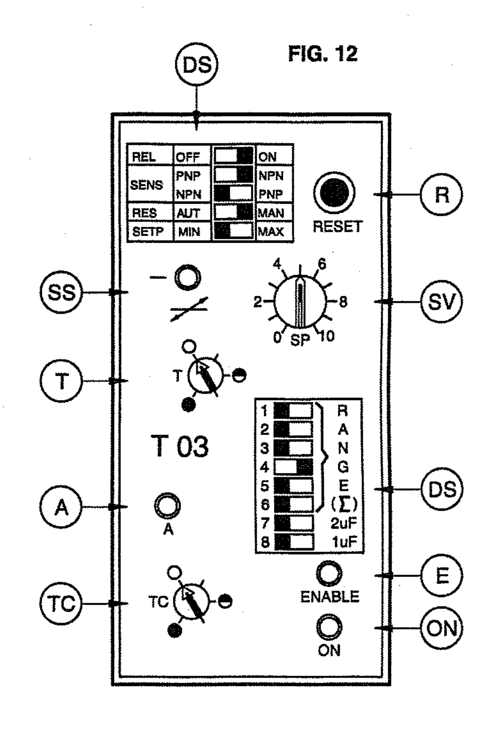
The function of the timers respect to the state of the relays is diagrammed in Fig. 13.

Leds (Fig. 12) permitting to keep some vital functions under control are also present on the panel:

f) Speed level overtaken **SS** with a red light switching on as soon as the set threshold is overcome.
g) Red alarm **A** lighting up when the internal relay switches on.
h) Green supply led **ON** pointing out that the device is electrically supplied.
i) Yellow supply led **ENABLE**, signalling that the device is ready to operate.

N.B.: For further details concerning electronic features and connections, refer to the specific instructions supplied with the device.

FIG. 12



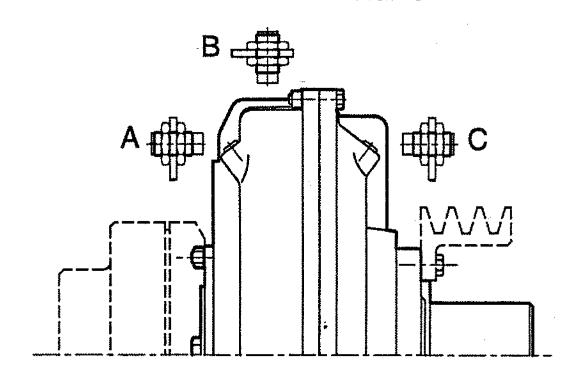
5.3 INFRARED TEMPERATURE CONTROLLER

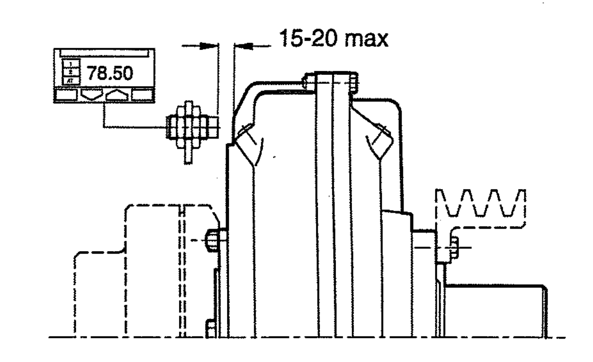
This is a non contact system to check fluid coupling temperature.
It is reliable and easily mounted.
It has two adjustable thresholds with a logical alarm on the former, and a relay alarm on the latter.

The proximity sensor must be positioned near the fluid coupling outer impeller or cover, according to one of the layouts shown in Fig. 13.
It is advised to place it in A or C positions, as the air flow generated by the fluid coupling during rotation helps to remove possible dirt particles that may lay on the sensor lens.
The distance between the sensor and the fluid coupling must be about 15÷20 mm (cooling fins do not disturb the correct operation of the same sensor).
To avoid the bright surface of the fluid coupling to reflect light, and thus compromise a correct temperature reading, it is necessary to paint the surface of the fluid coupling which is directly facing the sensor of a flat black color (a stripe of 6÷7 cm is sufficient).
The sensor cable has a standard length of 90 cm. In case of need, a longer one may be used only if twisted and shielded as per type "K" thermocouples.

N.B.: For further details concerning electronic features and connections, refer to the specific instructions supplied with the device.

FIG. 13





6. RECOMMENDED SPARE PARTS (Fig. 16-17)

When ordering spare parts , always specify model and spec. nr. marked on external impeller in the position shown in Fig. 15 or in the opposite side (cover) 27K, 29K and 34K have a plate reporting serial nr. too.

6.1 Seal kit for ...KR / ...KSD items 4-5 (5a for C.../CC... versions)-6-15-20-41 (item 41 for 27-29-34 ...KR and for 27 ...KSD) O-Rings and seals in Viton.
6.2 Fusible plug item 13a
6.3 Rubber element (for ...KRG only) item 28.

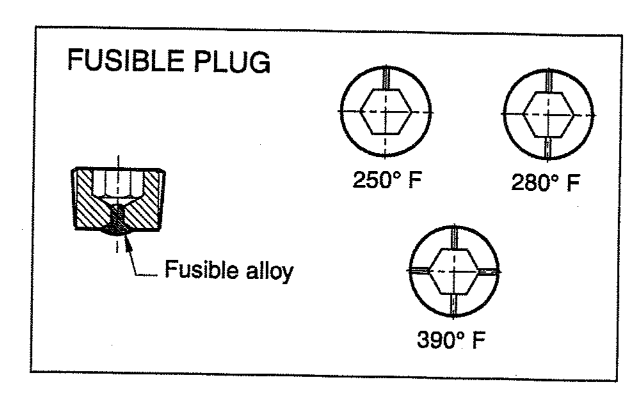
N.B. Code numbers for possible orders are shown on Tab. H.

TAB. H

DIM.	GASKET KIT (VITON) 2395 K	GASKET KIT (VITON) 2395 CK... CCK...	FUSIBLE PLUG N7018 250°F	FUSIBLE PLUG N7018 280°F	FUSIBLE PLUG N7018 390°F	RUBBER BLOCK N°	RUBBER BLOCK CODE
6	A	–	AA	AB	AC	8	BT-A
7	B		BA	BB	BC	12	BT-B
8	C						
9	D						BT-C
	S(2)						
11	EA	EB					
	TA(2)	TE(2)					
12KR	FA	FB					
12KSD	GA	GB				–	–
	UA(2)	UB(2)					
13	HA	HB	CA	CB	CC	16	BT-C
15	KA	KB					
	VA(2)	VB(2)					
17	LA	LB					BT-D
19	MA	MB					
21	NA	NB					BT-P
24	OA	OB					
27	PA	PB	DA	DB	DC		BT-T
29	QA	QB					
34	RA	RB					BT-I

(2) KSD/CKSD/CCKSD version with QD

FIG. 14



TAB. K

K... CK.. CCK..	item 9 screw	item 9 lb-ft	item 10 nut	item 10 lb-ft	item 11 nut	item 11 lb-ft	item 30 screw	item 30 lb-ft	item 34 screw	item 34 lb-ft	item 37 nut	item 37 lb-ft	intem 48 screw	intem 48 lb-ft
6	M6	7.5	M5	4.5	M7	12	M6	7.5	–	–	–	–	–	–
7-8			M6	7.5										
9-11	M8	18	M8	18	M8	18	M8	18	M8	18	M8	18		
12														
13					M10	37					M10	37		
15	M10 (1)	37	M10	37			M10	37	M10	37				
17-19														
21	M14	100	M12	63	M14	100	M14	100			M14	100		
24			M14	85										
27				100	M16	151			M14	100	M16	151		
29			M16	151										
34 K...	M16	151	M20	295	–	–	–	–			–	–	M14	100
34 KRD...					M16	151								
34 CK...					–	–					M16	151	–	–
34 CCK...														

Nm = lb-ft x 1.3558
(1) Only for 17 - 19...KSD: 62 lb-ft

7. O-RINGS AND BEARINGS REPLACEMENT (FIG. 16-17)

N.B. To hit the surfaces described in the following, always use plastic hammer.

7.1 Drain oil from coupling by unscrewing the caps (item 13) on cover and delayed fill chamber, and fusible plug item 13a.
7.2 If the fluid coupling is supplied with a delayed fill chamber, remove it after unscrewing item 34.
7.3 Unscrew nuts (item 11), insert 2 screwdrivers in the slot between bearing carrier (item 14) and cover (item 3), and act to push bearing carrier and seal(item 15) out.
7.4 Unscrew bolts (items 8-10), tap over the cover (item 3) to remove it.
7.5 Remove bearing (item 16) with an extractor, as well as the oil retainer (item 47).
7.6 Remove the snap ring (item 18) and then the impeller (item 1).
7.7 Remove screws item 9 and plate washer item 17. Bump on plane B of the shaft (item 24 for ...KR, item 25 for ...KSD) and slide the bearing carrier (item 23 for ...KR, item 24 (KSD), or 24a (KSD QD) away with the seal (item 20).
7.8 When reassembling, proceed inversely by replacing bearings and **all seals.** Use sealing paste between the plate washer (item 17) and the impeller (item 21).

N.B. To lock all bolts and caps refer to the listed torques:
Tab. E for items 13-13a
Tab. K for other items.

FIG. 15

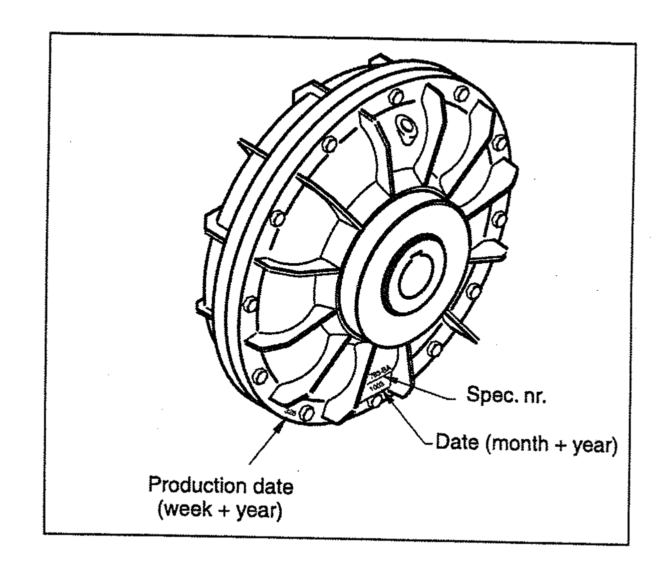




FIG. 16

KR

...KRD

Only for 34 KRG

Only for 34 CKRG/CCKRG

...KRG

Only for CK../CCK..
15-17-19-21-24
27-29-34

...KRB/...KRBP

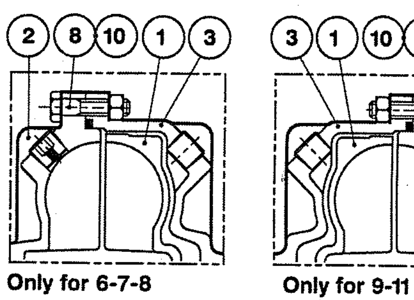
CKR/CCKR

POS.	NAME
1	IMPELLER (INNER)
2	IMPELLER (OUTER)
3-3a	COVER
4	O-RING
5-5a	GASKET OR O-RING
6	GASKET OR O-RING
7-7a	SCREW
8	SCREW
9	SCREW
10	NUT
11	NUT
12	LOCK WASHER
13	PLUG
13a	FUSIBLE PLUG
14-14a	BEARING CARRIER
15	SEAL
16	BALL BEARING
17**	PLATE
18	SNAP RING
19	SEAL CARRIER
20	SEAL
21	BALL BEARING
22	SNAP RING
23	BEARING CARRIER
24	SHAFT
25	FIXING SCREW

** excluded 6

POS.	NAME
26	WASHER
27	FLANGE G
28	RUBBER BLOCK
29	HALF JOINT G
30	HALF JOINT B
31	SHAFT D
31.1	KEY
33	D.F. CHAMBER
34	SCREW
35	LOCK WASHER
36	SCREW
37	NUT
38	LOCK WASHER
39	LOCK WASHER
40	PLATE
41	O-RING
47*	OIL RETAINER
48-48a	SCREW
49-49a	LOCK WASHER
57	VALVE ASSEMBLY
58	GASKET
60	SCREW
61	LOCK WASHER
62	SET SCREW
67	ADAPTOR

* Only for 15 ÷ 34



Only for 27-29-34

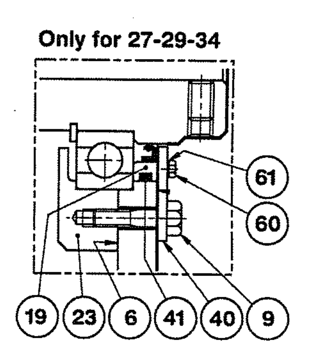




FIG. 17

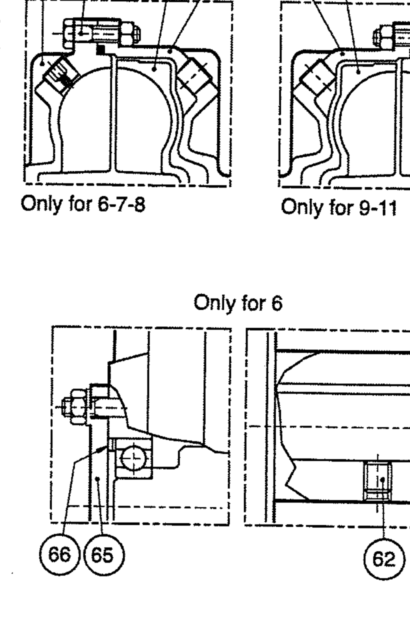
...KSD-QD with COLLET (6 ÷19)

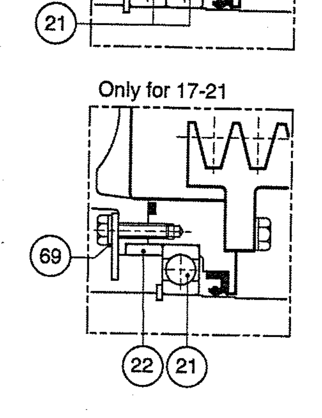
...KSD-QD (15 ÷ 24)

Only for CK../CCK.. 15-17-19-21-24 27-29-34

...KSDF (15 ÷ 24)

...KSI (15 ÷ 24)





POS.	NAME
1	IMPELLER (INNER)
2	IMPELLER (OUTER)
3-3a	COVER
4	O-RING
5-5a	GASKET OR O-RING
6	GASKET OR O-RING
7-7a	SCREW
8	SCREW
9	SCREW
10	NUT
11	NUT
12	LOCK WASHER
13	PLUG
13a	FUSIBLE PLUG
14-14a	BEARING CARRIER
15	SEAL
16	BALL BEARING
17**	PLATE
18	SNAP RING
20	SEAL
21	BALL BEARING
22	SPACER
23	SNAP RING

** Excluded 6

POS.	NAME
24	BEARING CARRIER
25-25a	SHAFT
26	FIXING SCREW
27	WASHER
28	INTEGRAL SHEAVE
29-29a	BOLTED SHEAVE
30-30a	SCREW
33	D.F. CHAMBER
34	SCREW
35	LOCK WASHER
36	QD HUB
39	LOCK WASHER
47*	OIL RETAINER
50	LOCK WASHER
57	VALVE ASSEMBLY
58	GASKET
62	SET SCREW
63	COLLET
64	KEY
65	COVER
66	WAVE SPRING
69	LOCK WASHER

* Only for 15 ÷ 24



For Electric Motors and Internal Combustion Engines:

ENERGY EFFICIENT

REDUCE POWER CONSUMPTION

PROTECT EQUIPMENT AND PROVIDE SMOOTH ACCELERATION

IMPORTANT NOTICE, WARRANTY: Seller warrants its product sold herein against defects in material and workmanship for a period of 12 months from the date of invoice; provided, that the installation, operation and maintenance of said product conforms with any and all manufacturer's specifications and all applicable government health and safety regulations. Seller's obligation under this warranty shall be limited to replacing and or repairing, at its facility or facility so designated, any part thereof which has been demonstrated to be defective. Seller shall not be responsible for any and all costs related to the disassembly, transportation and shipment to Seller's repair facility and reinstallation of any defective part or parts repaired according to the terms of this warranty. The Seller's sole responsibility shall be to repair and replace defective parts according to the terms of this limited warranty; Sellers shall not be responsible for any and all consequential damages including, but not limited to, personal injury, property damage and loss of income and profits. The drawings, charts, diagrams and information contained in this sales package are for the sole purpose of identifying the product and shall not be deemed to create an expressed warranty that the goods shall conform to such description. No affirmation, promise or description shall be deemed part of the basis of the bargain.

This warranty is expressly in lieu of all other warranties expressed or implied including the warranty of merchatability and fitness for a particular purpose or use and all other obligations or liabilities on the Seller's part.

Seller neither assumes, nor autohorizes any other persons to assume for it, any other liability in connection with the sale of this product.

LOCAL DISTRIBUTOR

KRAFT POWER CORP.

1000B Northbrook Parkway Suwanee GA 30024 Tel. 770/963-6288
Toll Free 800/394-0078 Fax: 770/963-9678 E-mail transfluid@kraftpower.com


Document No.: PE-S-069-03-03



CERTIFICATE OF ORIGIN

Equipment:	Centrifuge
Model:	DE-1000™ GBD, DE-1000™ FHD, DE-1000™ VFD
Characteristics:	0-600VAC, 50/60Hz, 3PH

Derrick Corporation acknowledges that the above set-forth product is manufactured in the United States of America as of the data of this certificate. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Date: 29-December-2011

Signature: Jennifer J. Polanowski
Derrick Corporation




Document No.: PE-S-009-08-00

CERTIFICATE OF QUALITY

Equipment:	Centrifuges
Model:	DE-1000™ GBD, DE-1000™ FHD, DE-1000™ VFD, DE-7200 VFD
Characteristics:	0-600VAC, 50/60Hz, 3PH

Derrick Corporation acknowledges that the above set-forth product conformed to the requirements for the applicable purchase order at the time of its original shipment by Derrick Corporation in that all construction materials and components were new and unused, were manufactured for this product, and that it was free of any known defects as to their design, material and workmanship. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Date: 29-December-2011

Signature: Jennifer J. Polanowski
Derrick Corporation





Document No.: PE-S-073-04-00

SHIPPING FINAL INSPECTION AND RUN TEST CERTIFICATE

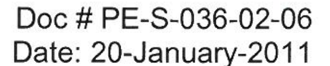
Equipment:	Centrifuges
Model:	DE-1000™ GBD, DE-1000™ FHD, DE-1000™ VFD, DE-7200 VFD
Characteristics:	0-600VAC, 50/60Hz, 3PH

The product listed above was inspected and found to be in conformance with Derrick Corporation's internal coating, run test, and assembly inspection documents that were required for the type of equipment manufactured in accordance with the Derrick quality system. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the referenced product.

Date: 29-December-2011

Signature: Jennifer J. Polanowski
Derrick Corporation




Doc # PE-S-036-02-06
Date: 20-January-2011

CERTIFICATE OF CONFORMANCE

Equipment:	Mining & Oilfield equipment manufactured specifically for Hazardous Location Areas including but not limited to: Flo-Line® Cleaners, Flo-Line® Primers, Agitators, Vacu-Flo™ Degassers, DE-1000™ Centrifuges, Centrifugal Pumps, Flo-Line Scalpers™ etc.
Name and Address of Manufacturer:	Derrick Corporation 590 Duke Road Buffalo, NY 14225
Rating and Principle Characteristics:	0-600 VAC, 50/60Hz, 3PH
Model / Type Ref:	Various
Additional Information:	None

This product was found to be in conformance with:

U.L. listed for hazardous locations Class I, Division 1, Groups C & D, which is similar to equipment marked as II 2G Ex d IIB T3 for Zone 1 areas. Assembled in accordance with National Electrical Code (NEC) – articles 500 thru 506 (hazardous locations) where applicable.

Additionally:

Derrick Corporation certifies that the above-listed equipment for the referenced order conformed to the requirements of the specified order at the time of its original shipment by Derrick Corporation in that: all construction materials and components were new and unused, manufactured for this equipment, and that the goods were free of any known defects as to their design, material and workmanship. This certificate is governed by the applicable purchase order terms in effect at the time of Derrick Corporation's original shipment of the above-listed equipment.

DERRICK CORP. JAN 19 2012 ENGINEERING DEPT.

Signature: For Thomas Silvestrini